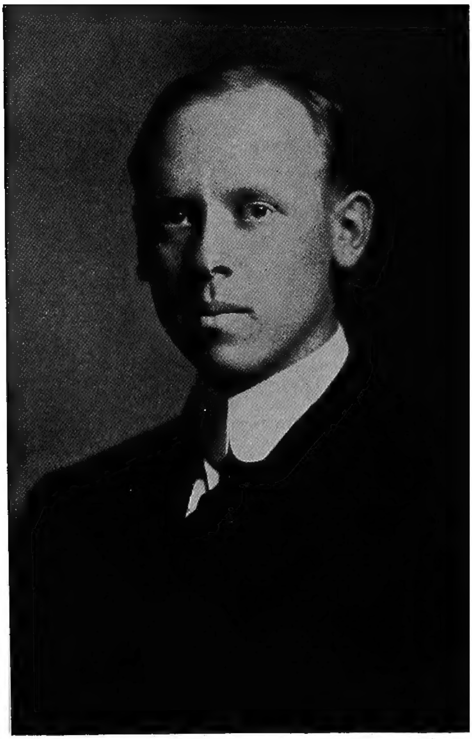

Paul Work

STATE OF NEW YORK

DEPARTMENT OF AGRICULTURE

CHARLES S. WILSON, Commissioner

7

Bulletin 70

The Vegetable Industry in New York State

"It is not simply beets and potatoes and corn and string beans that one raises in his well-hoed garden; it is the average of human life."
CHARLES DUDLEY WARNER

Issued by the Bureau of Farmers' Institutes and Compiled under the Supervision of the Director

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INTRODUCTION

Since the long ago when " the Lord God planted a garden eastward " and set man " to dress and to keep it " that he might live from the fruits thereof, gardens large and small have occupied an important place in man's affairs, even though, falling into a more savage state, he became more or less a carniverous animal. For the most part he has remained such until the present, when in our most civilized countries the scarcity and high price of meat is of necessity turning mankind back to a better diet, made up more largely of " the fruits of the ground " rather than the flesh of " beasts of the field."

Few realize how great is this industry among the many in our state's agriculture, vegetables exceeding in value both the wheat and the corn crop. With these facts in mind it is readily apparent that the subject of vegetable growing should loom large; and in the series of bulletins which the Bureau of Farmers' Institutes in the New York State Department of Agriculture is publishing, should occupy an early and conspicuous place.

Two thoughts have been uppermost: first, that it may contain specific directions which will be of material help to all classes in meeting the varied problems with which the gardener has to contend; second, that it shall set forth to our own people and to the many from outside our borders — whose minds are turning hither as a possible dwelling place — the magnitude and variety of the business, as well as the many sections particularly well adapted by nature to one or more lines of vegetable growing, within easy reach of some of the world's best markets.

To accomplish this purpose the compiler has enlisted the services of scientists from our Stations to advise as to soils, fertilizers, diseases and insect pests; also specialists in growing or handling various vegetables — from the seed to the market and table — both from our own state and beyond, in order that it might be cosmopolitan and not warped by local prejudice or sectional limitations. The fundamentals treated are applicable everywhere.

To all who have so freely contributed of their best, the compiler would record his obligation and appreciation; particularly to those personal friends from whom he has exacted and received tribute, chief among whom are Mr. Paul Work and Mr. A. E. Wilkinson, of Cornell University, without whose advice and assistance this bulletin could not have been issued.

Those interested in the subject are made up of all sorts and conditions of men, including not only the child with the strip of ground so dear to his heart, which has first brought him in touch with Nature's wonderful mysteries of the development of the seed into the living plant, and which has engendered a love for the soil never forgotten; the urban dweller with his circumscribed garden plot, whose hours of sunshine are as few as those in the canyons of the mountains, and the farmer with his more ample space — sometimes, alas, like "the field of the slothful and the vineyard of the man void of understanding," yet when properly managed a most potent factor in his farm economy — but also the one who specializes in vegetable growing on a large scale. To all of these whom this volume reaches with the springtime goes the wish on the part of the compiler, that it may be not only productive of seed sowing, but also assist in a more abundant harvest.

MARKET GARDENING IN NEW YORK STATE

A. E. Wilkinson

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In order to thoroughly understand what is meant by market gardening, it will be best to define it: "Market gardening is the intensive growing of vegetables, generally on limited areas and very near market." It may be seen from this definition that one naturally expects to find market gardeners located around all our large cities, and this is true. There are, however, one or two exceptions to this rule, where one may find market gardeners situated a considerable distance from their markets. A noted exception is the Hallock Farm at Orient, N. Y., where thirty-four acres are under the Skinner irrigation system, all being devoted to intensive vegetable production.

Near New York City, on Long Island, are found a great many market gardeners. The soil there is particularly adapted to the growing of vegetables under intensive systems. Most of the men there are Germans, Poles, Belgians, or from other European countries. Very few greenhouses are used; most of the forcing work is accomplished by using hotbeds and cold frames. It is possible to find men who have 3,500 to 4,000 sash on their small farms. The writer is acquainted with a market gardener who has a twenty-acre farm, three acres of which is covered with thirty-five hundred sash, the remainder of the land being under the overhead system of irrigation. Other men with only five acres have from 1,500 to 2,500 sash.

All of the product raised by these men is marketed in Brooklyn or New York City, being carried there on wagons and sold from them at an early hour in the morning. The selling takes place in a public market, two of the largest being Wallabout in Brooklyn and Harlem in New York.

Through Westchester county are also many market gardens supplying vegetables to the New York market. Newburgh on the Hudson has a group of market gardeners who are very well organized and are catering strictly to the needs of their local market. At Poughkeepsie is found another group of market gardeners who both cater to local market and do a considerable shipping business. There are a few market gardeners at Kingston, Catskill, and Hudson, all catering to the local need. Around the capitol district, that is, Albany, Troy, and Schenectady, there are many market gardeners. However, no place in that section is as well known as Watervliet. Here may be found farm after farm devoted to the growing of vegetables for the markets in these

FIG. 340. A ROW OF COMMISSION MERCHANTS NEAR HARLEM MARKET, NEW YORK CITY

three large cities. Near Oswego, Watertown, Amsterdam, Utica, Rome, and Herkimer a few market gardeners supply the needs of the local market and in some cases have a surplus which is sent elsewhere.

It is possible to find market gardeners about Syracuse no matter in what direction one travels. The tendency among these is to practice some of the more modern ideas. They are slowly getting away from hotbeds and cold frames and working into greenhouses. Most of them have extra choice sandy loam in which to grow their crops. Practically all of the men drive to market, selling their goods in the large public square.

At Irondequoit, Monroe county, is located the largest greenhouse vegetable forcing community in New York State, there being over a hundred growers, each of whom has one or more glass houses. Practically all of these growers look on hotbeds and cold frames as forcing structures not to be considered in their scheme of farming. The Irondequoit growers should be called the New York State advance guard in the most up-to-date lines of forcing vegetables. They raise radishes and lettuce in the fall, sometimes also cucumbers or tomatoes, and cucumbers are often grown in the spring. They also grow a great variety of vegetables on the land outside the forcing structures. Their product is sold locally on the public market from their wagons or to special customers such as hotels, restaurants, and stores. When a surplus is found, it is shipped away to other markets.

Near Buffalo there are a great many market gardeners located at Gardenville, Hamburg, Eden, Sanborn, Lancaster, Jewettville, South Wales, and other towns. Many of these are using the hotbeds and cold frames, and a few have the more modern greenhouse structure. All are intensive growers of vegetables outside as well as inside the forcing structures. The product is carried by wagon to the Elk Street or to the Polish market and is there sold. Some of the vegetables are shipped away either through a local association or through the hands of commission men.

At Elmira, Ithaca, Cortland, Auburn, Binghamton, Port Jervis, and Middletown are found market gardeners, several being located near each of these cities to supply the local demands. In some cases up-to-date greenhouses are used, supplemented with hotbeds and cold frames, and outside gardening is practiced as well.

INTENSIVE CULTURE

The intensity of the operations conducted by the men near the different cities is quite apparent when one understands that from their land they are able in a single season to remove from one to three crops. In some cases, particularly on Long Island, even four crops are removed in some years. It is necessary for these men to reap many crops each year because of the high valuation of the land. Near New York City an acre of land is worth almost any price — $5,000 to $7,500 or even more — while in other

places it seldom fall lower than $250, and in many places averages $1,000 per acre.

Another reason is found in the marketing conditions. Companion and succession cropping are commonly practiced, a crop such as beets or carrots occupying the land early in the spring, followed by a crop of celery later. Between the celery two rows of lettuce may be sown, making three crops from the same land the same year. Again, peas may be grown early, followed by beets or carrots. Sometimes lettuce or onions are grown between a crop of tomatoes when the tomatoes are young. The men take every advantage of the space and the season, working, if possible, to obtain the maximum yield and the maximum number of crops from every piece of land. It is then quite evident to some people

FIG. 341. CONSERVING MOISTURE BY THOROUGH TILLAGE

that a man with a five-acre farm is really cultivating a farm of fifteen or twenty acres where he uses succession crops. A wide diversity of crops is raised and not one specialty, because the men have markets to supply that demand a great variety of vegetables. Also, if the grower wishes to hold his trade, he should be on the market nearly every day, often selling some particular crop at a very small profit rather than losing trade. In order to carry out this plan, it is absolutely necessary to grow many different crops and at different seasons.

STABLE MANURE AND TILLAGE

All of the market gardeners use large quantities of manure. Very few of them understand the use of commercial fertilizer. Often forty to sixty tons of manure are applied to each acre each year. The result from this liberal manuring is that the soil has a very fine texture. Crops grow very rapidly, of large size, and are, therefore, very desirable. Most of the market gardeners practice deep preparation of the soil, following with thorough fining and smoothing, the preparation of the soil being of the utmost importance with these men. After the plowing and fitting many gardeners do not utilize the horse at all in their work, preferring to use the man-power wheeled planters and cultivators. By this method the crops are planted very close together, resulting in obtaining a larger yield from each acre. Much more hand labor is used than in any other line of farming. Often ten to fifteen workers are found at times on a five-acre garden, and on the larger gardens, such as a twenty or twenty-five acre farm, from three to five laborers per acre are often utilized profitably.

HOME-GROWN SEED

In some places, particularly among the market gardeners of Long Island, a certain amount of seed is raised. Thus, to a certain extent, these gardeners are independent of the seed houses, especially for particular vegetables. It would be indeed difficult to duplicate the celery raised by these Long Island men from seed produced by them, and this could also be said of the lettuce which they grow from their own seed in the hotbeds and cold frames.

IRRIGATION AND MARKETING

Slowly these market gardeners are realizing the importance of controlling one more factor — that is, water — and thus preventing drought. On Long Island there are several men who have ten acres or more under irrigation. In other parts of New York State irrigation systems are being installed and successfully used, particularly at Irondequoit and Syracuse. Practically all of the material raised on these market gardening farms is carried to the cities on the teams or auto trucks owned by the market gardeners. Most of the teams have a certain place in the markets

FIG. 342. OVERHEAD IRRIGATION USED FOR LEEKS DURING THE GREAT DROUGHT, OCTOBER, 1914, FLUSHING, L. I.

and are found at these stands each morning during the week. Besides placing their teams on the markets, many of the growers have private trade — hotels, restaurants, stores, and the like. Here they deliver their high-class product early in the morning. Some of the best growers send to the city from three to five loads or more each day during the summer, a certain number attending the market and others looking after the local demands. It is an interesting scene as well as an educational opportunity to visit and study any one of the large city markets, such as the Wallabout or Harlem market in New York City or the public markets at Troy, Syracuse, Rochester, or Buffalo. Many of the smaller cities are establishing public marketing places, much to the advantages of the producer and the consumer.

VEGETABLE GROWING ON LONG ISLAND

W. B. Nissley

Department of Vegetable Gardening, New York State School of Agriculture, Farmingdale, L. I.

There are three distinct phases of commercial vegetable growing developed to a high degree on Long Island, namely:

1. Market gardening, which is highly developed on the western end of the island within driving distance of the large wholesale and retail markets of New York City.

2. The growing of vegetables for the canning and pickling industry throughout the central part of the island.

3. Truck gardening in the eastern part of the island, which is more remote from the large markets.

MARKET GARDENING

Market gardening is the chief agricultural occupation on the western end of Long Island. Land as a rule is very high priced

Fig. 343. Typical Long Island Market Wagon in Harlem Wholesale Market

— in many cases it is worth several thousand dollars an acre and in some cases even more; therefore, the methods practiced are very

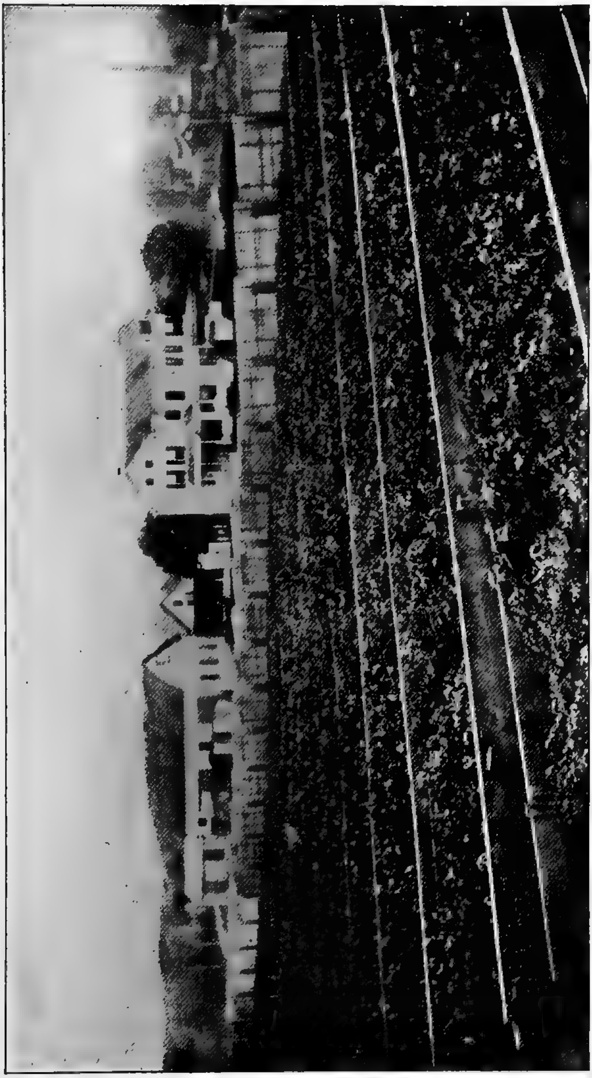

FIG. 344. MATURE CARROTS IN COLD FRAMES, TO BE PROTECTED AND BUNCHED DURING DECEMBER AND JANUARY, FLUSHING, L. I.

intensive. A great deal of hand work is resorted to in cultivating. Companion and succession cropping are developed to a high degree. Large areas of glass are used in the form of cold frames in order that a continuous supply and a large assortment of vegetables can be marketed during as many months of the year as possible. There are very few forcing houses in the form of greenhouses, since much of the land is rented and therefore no permanent improvements are made. A great proportion of the gardeners are foreigners — Poles, Italians and Germans. The marketing is usually done personally, by attending the large wholesale and retail markets of New York City. The style of the Long Island market wagon is peculiar to this section and parts of New Jersey adjacent to New York. The load of vegetables is usually sold wholesale, sometimes by the load and sometimes by the barrel, bushel or crate. The grower likes to sell his vegetables as soon as possible and return home in order that a day's work can be done.

Fig. 345. Carrots Matured in Cold Frames in the Fall, to be Protected With Glass and Bunched During the Winter, Elmhurst, L. I.

The cold frames are used as early in the spring as weather conditions permit. Sometimes the seed bed is prepared in the fall and left until January or February when seed can be sown. The first early cold frame crops consist mostly of salad plants, such as lettuce, endive and parsley, and such crops as radishes, early beets, carrots, etc. The crops grown in the open ground include vegetables that can be grown commercially in this latitude; the assortment is very large. Cold frames are also brought to use in the fall and winter by growing such vegetables as beets, parsley, carrots and parsnips in the frames during the fall, and covering them over with glass during severe weather. In this way these crops can be bunched during December and January.

CONNECTICUT
New Haven
New London
Saybrook
Madison
Bridgeport
South Norwalk
Stamford
Port Chester
Yonkers
Mt. Vernon
New Rochelle
NEW YORK
Norwalk Ids.
Fishers Id. Sound
FISHERS ISLAND
The Race
BLOCK ISLAND
BLOCK ISLAND SOUND
LONG ISLAND SOUND
MONTAUK STEAMBOAT COMPANY'S LINE FROM NEW YORK
MONTAUK STEAMBOAT COMPANY'S LINE TO BLOCK ISLAND R.I.
TO BRIDGEPORT, CONN.
Plum Gut
Plum Id.
Orient Pt.
Orient P.O.
East Marion
GREENPORT
Southold
SHELTER ISLAND
GARDINERS BAY
GARDINERS ISLAND
Montauk Pt.
MONTAUK
Fort Pond Bay
Napeague Beach
Amagansett
Easthampton
Wainscott
BRIDGEHAMPTON
SAG HARBOR
Sagaponack
Mecox
Southampton
Watermill
Shinnecock Bay
Good Ground
Canoe Place
East Quogue
Quogue
Westhampton
Westhampton Beach
Remsenburg
Speonk
Eastport
Moriches Bay
East Moriches
Center Moriches
Mastic
Manorville
Calverton
Riverhead
Aquebogue
Jamesport
Laurel
Mattituck
Cutchogue
Peconic
Great Peconic
Little Peconic Bay
Noyack
Robbins Id.
Flanders
Baiting Hollow
WADING RIVER
Shoreham
Rocky Point
Millers Place
Mt. Sinai
Port Jefferson
Setauket
Stony Brook
Old Field Pt.
Cranes Neck
St. James
Smithtown
Nesconset
Lake Grove
Lake Ronkonkoma
Middle Island
Coram
Selden
New Village
Hauppauge
Commack
Elwood
Kings Park
Northport
Fort Salonga
Greenlawn
Centreport
Huntington
Cold Spring Harbor
Syosset
Plainview
Hicksville
Bethpage
Farmingdale
Pinelawn
Wyandanch
Deer Park
Brentwood
Central Islip
Islip
East Islip
Great River
Oakdale
Sayville
Bayport
Blue Point
Patchogue
Bellport
Brookhaven
Medford
Holtsville
Holbrook
Ronkonkoma
Yaphank
Babylon
Lindenhurst
Amityville
Copiague
Massapequa
Seabury
Wantagh
Bellmore
Merrick
Freeport
Baldwin
Rockville Centre
Oceanside
Lynbrook
Valley Stream
Hempstead
Garden City
Mineola
Westbury
Central Park
Roslyn
Manhasset
Great Neck
Port Washington
Sea Cliff
Glen Cove
Glen Head
Oyster Bay
Lloyds Pt.
Eatons Pt.
Huntington Bay
Jamaica
Flushing
Whitestone
Bayside
Douglaston
Little Neck
College Pt.
Woodside
Winfield
Corona
BROOKLYN
KINGS
Flatbush Av.
Bushwick
Bay Ridge
Ft. Hamilton
Ft. Wadsworth
Ft. Tompkins
St. George
STATEN ISLAND
Newark Bay
Coney Island
Manhattan Beach
Rockaway Beach
Far Rockaway
Lawrence
Long Beach
Lookout
Jones Beach
Oak Island Beach
Fire Island
Saltaire
Point O'Woods
Ocean Beach
Water Island
GREAT SOUTH BEACH
GREAT SOUTH BAY
ATLANTIC OCEAN
NASSAU
SUFFOLK
1
2
3
4
5

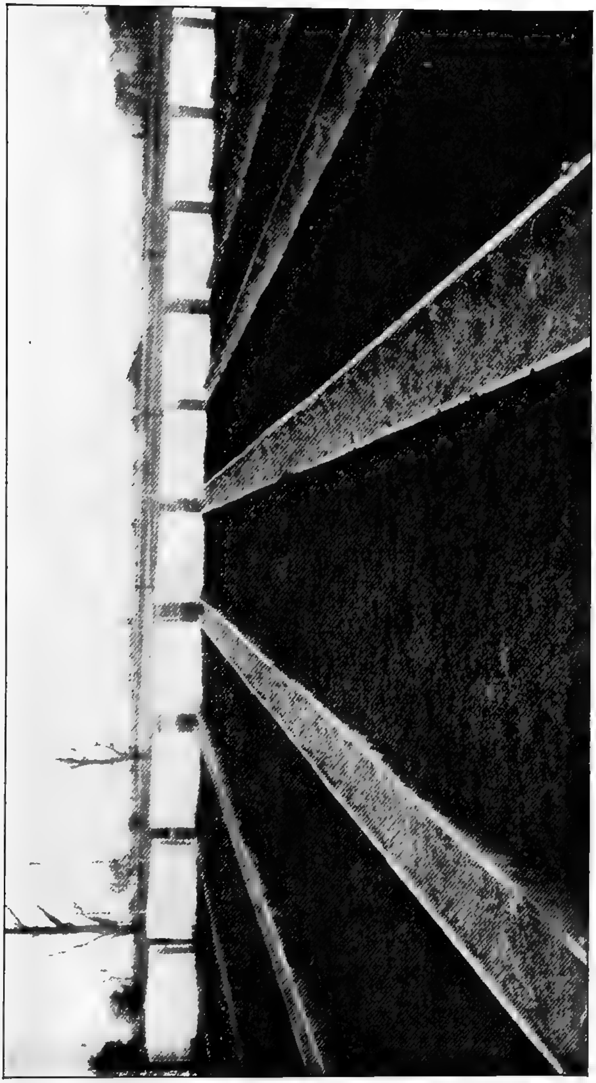

FIG. 346. PARSLEY IN COLD FRAMES IN AUTUMN, TO BE PROTECTED AND SOLD DURING THE WINTER, FLUSHING, L. I.

The market gardening section is represented on the map by (1) or that part of the Island west of Hicksville. There are also small market gardening sections in other parts of the Island to supply local towns and summer resorts, but the main section is confined to the area mentioned.

Large quantities of manure are used by these gardeners. A carload, or from 20 to 40 tons per acre, is not an exceptional application. This puts the soil (which is usually quite sandy) in ideal physical condition for working and holding fertility and moisture. The moisture factor is a very important one and some growers who own their small farms have installed and are installing the overhead system of irrigation.

The auto truck is taking an important place in marketing the produce. Larger loads and very much less time is spent on the way by the use of truck.

VEGETABLES FOR THE CANNING AND PICKLING INDUSTRY

That part of the Island designated on the map by figure (2) is the section is which is raised large quantities of cucumbers and

FIG. 347. BARRELS OF KRAUT IN A BOX CAR READY FOR SHIPMENT, HUNTINGTON, L. I.

tomatoes for pickling, and cabbage for kraut. These crops are raised on an extensive scale and very often in connection with general farming.

In the case of cucumbers, especially, the soil is given careful attention in its preparation. Manure is the chief fertilizer used as the water retaining capacity of the soil is very important for this crop. Large quantities of commercial fertilizer are not desirable from the canners' standpoint as the cucumbers grown under these conditions do not hold up as well after they are salted.

Dill pickles are the chief product of the pickling factories. The crop comes on about the first or second week in August and continues as long as the growers can fight the blight by thorough and frequent sprayings with bordeaux mixture. The pickles are sold to the canneries by the thousand, and from fifty to eighty thousand is a good yield per acre. The average price paid is about $2.50 to $2.75 per thousand.

FIG. 348. BARRELS OF TOMATOES IN A BRINE SOLUTION. ALSO SHOWS CARLOAD OF MANURE AND PART OF CANNING FACTORY

When the pickles are brought to the factory they are put into wine barrels into which has been placed some dill and about a quart of mixed spices; dill is also placed at the top of the barrels, after which they are securely headed and filled through the bung with a brine solution. The pickles are then allowed to ferment for several months.

The tomatoes, which follow cucumbers very closely, are also placed in a brine solution.

Cabbage for kraut is trimmed, cored and shredded into large,

wooden tanks holding about 20 tons. Fine salt is scattered between the layers of shredded cabbage. It is allowed to remain this way for ten days or two weeks, after which it may be put into barrels and shipped to market by the carload, while the tanks are refilled. Cauliflower is also pickled to some extent. Long Island dill pickles and sauerkraut have a wide reputation for their quality.

TRUCK GARDENING

Truck gardening is carried on very extensively in the eastern part of Long Island in connection with general farming. This section is represented on the map by figures (4) and (5) and roughly comprises that part of the Island east of Manorville and Calverton.

FIG. 349. RETAILERS' PUSH CARTS ON THE STREETS OF NEW YORK

On the Northern Peninsula (4) the chief truck crops grown are cauliflower, potatoes, (early and late) brussels sprouts and lima beans. The cauliflower industry is very highly developed and enjoys a wide reputation for high quality. Practically every farmer in this territory grows as much cauliflower as he can well handle. The crop is sold almost altogether through the Long Island Cauliflower Association which is in a very thriving condition and takes a great deal of responsibility along the lines of marketing from the growers. As these growers are remote from the markets and cannot market their products personally, representa-

tives of the association handle the produce in the city. The association also sells cauliflower in carload lots to other large markets such as New Orleans, St. Louis and Chicago.

On the eastern end of the island early potatoes dug in August are an important crop and good prices are usually realized. Farther west the late crop is the important one. It has been estimated that this year, which was a very good year for potatoes on Long Island, the crop approached 3,000,000 bushels. These have been largely sold in the past through the Long Island Potato Exchange, although great quantities are also sold through other sources. Lima beans are growing in popularity and the acreage is increasing; it is one of the newer crops in this section. They are sold green by the bushel. Brussels sprouts are also grown extensively and sold during the fall and winter.

On the southern peninsula (5) cauliflower and brussels sprouts are not grown commercially, due to unfavorable climatic and soil conditions. Potatoes and lima beans are the chief vegetable crops. Due to the scarcity and high price of manure in the eastern part of the Island, cover crops are grown to a great extent, mostly rye; large quantities of commercial fertilizers are used, very often as high as one ton per acre for cauliflower and potatoes. The produce is practically all carried by railroad to New York City. During the cauliflower season a special train is run each day collecting cars of cauliflower from Southold to Manorville and thence direct to New York. There is a small trade across the sound to New London and Bridgeport, Connecticut.

That section of the map indicated by figure (3) is undeveloped; much of it is in a wild state, overgrown with pines, scrub oak and small sprouts. However, there are numerous cleared spots or farms. Throughout the central part of the Island, around Middle Island, Yaphank, Manorville, Selden and Holtzville, fruit growing is very popular, especially peaches. There are several orchards containing over 100 acres. Shelter Island is also an apple producing section and some vegetables are grown there.

The north and south shores are very rapidly becoming more and more popular as summer resorts and draw thousands of people each season. For this reason there is quite a local demand for fresh vegetables and a number of growers are taking advantage of the opportunity.

TRUCK GARDENING ON THE UPLANDS OF WESTERN NEW YORK

W. E. Evans, Alden, N. Y.

ADVANTAGES OF SECTIONS ABOUT BUFFALO AND CHARACTER OF THE FARMS

A light, sandy loam; an excellent market for vegetables in Buffalo; a cheap source of stable manure in the same city and good roads leading to it, make Western New York particularly adapted to vegetable growing.

By far the largest part of the vegetables used in Buffalo is raised on small farms located just beyond the city limits. The land originally belonged to a religious sect known as "Ebenezers," who, when they moved to Iowa, divided their farm land into lots about thirty acres in size. As a result the farms in this section are all of this size or a multiple thereof, fifteen being a common acreage. The average amount of land devoted to the raising of vegetables is ten. the remainder being devoted to growing feed for the farm animals.

The worth of this land is determined by the possibility of cutting it into city lots rather than by its fertility. Few of the farms which are for sale can be bought for less than $500 per acre. Railroads paid $1,000 per acre for land they bought, and after it is cut up into city lots it is worth $1,200 per acre.

TYPE OF SOIL AND CLIMATIC CONDITIONS

No one particular soil type is common in this section although the light, sandy loams predominate. Some are creek bottom land and have excellent drainage in the form of a gravel subsoil, while others have a hardpan subsoil. A few are heavy clays.

In this narrow strip surrounding Buffalo the seasons are about

two weeks later than in the more inland section, due to the influence of the cold winds from Lake Erie. The prevailing winds come from the west and bring abundant snows and rainfall during the late winter and early spring, but the summers are often dry.

NEED AND METHOD OF DRAINAGE

The drainage for the most part is naturally poor and nearly every farm has more or less tile drain. About 1,500 feet of tile to the acre is required. It is placed on an average of three and one-half feet below the surface, although I know of one instance where a tile was laid fifteen feet in order to get through a knoll and drain a hollow spot. Glazed tile, seldom over four inches in diameter, are used. They are given a fall of not less than one inch to a hundred feet and are interspersed with numerous silt basins. Experience has proven that tile laid more than ten or twelve feet apart, if three and one-half feet deep, are not effective quickly enough to save the delicate root systems of the leafy vegetables.

In many instances it was necessary for several farmers to cooperate and join main tile to secure outlets for the water. In a few cases part of the farm has a gravelly subsoil and part a hardpan. In such farms the clays are drained by leading a tile to the gravel and allowing the water to drain away in that manner. In a few cases quicksand was encountered. Here a concrete bottom was made before laying the tile.

About 85 per cent. of the farmers have tiled to some extent, while 30 per cent. have a complete system of tile drainage. The natural system rather than the gridiron system has been adopted.

MANURE AND METHODS OF HANDLING

These farmers secure their manure from the Buffalo stables drawing two or even three loads each week. Sometimes two farmers cooperatively contract to keep a stable clean by drawing a load each day. Enormous quantities of manure are used and sometimes it seems impossible to plow it under. The manure is made from shavings instead of straw bedding and in the case of the breweries it contains many hops. Both of these tend to sour the soil.

Nearly every farmer has learned the value of lime, and by cooperating they buy in carload lots. They use quicklime entirely and either air or water slake it themselves. Again they cooperated and bought a community lime drill which spreads the fine powder without any danger to man or beast, and, besides distributing it evenly, the desired quantity can be applied by regulating the flow.

The truck farmers of Western New York are giving no little attention to the care of the manure. Drawing, as they do, such large quantities in the winter months when they cannot operate their spreaders, it is necessary to make great piles about three feet deep and often a hundred feet long. To this they add rock phosphate or acid phosphate at the rate of fifty pounds to the ton. This pile is turned twice and sometimes three times before it is spread on the fields. Some of this manure is used for top dressing to conserve moisture, much is used in hot bed construction and the remainder is plowed under.

In addition to this, nitrate of soda, sulphate of ammonia and sheep manure are purchased. These are used for forcing such crops as lettuce, spinach, etc., or to promote rapid growth to overcome blights or rusts.

GROWING SEEDLINGS

Each farmer reserves more or less space for cold frames and hotbeds. These are used chiefly for growing seedlings for transplanting, but a few farmers raise hotbed lettuce for the market.

Many farmers find profit in raising seedlings of both vegetables and flowers. These are sold to the Buffalo people who used them in their back yards. Cabbage and tomato seedlings are especially popular.

MARKETING

The farmers take a load of crated vegetables to market and bring back a load of "empties." They sell by wholesale only to commission merchants, wholesalers or hucksters, and by telephone can keep in touch with the buyers at all times. Usually the whole load is ordered goods so that all that is necessary is to deliver it and take orders for the next day. The growers take great pride in grading their goods and selling A1 vegetables in boxes marked as such.

The marketing facilities of this section are ideal. A farmer can go to the Buffalo markets, deliver his goods, take his orders for the next day and get home before noon. Nearly all the roads leading to Buffalo are brick paved and afford excellent traveling facilities for these men.

LABORERS

Laborers are abundant. Hundreds of Polish women walk from Buffalo to these farms and work for from $1 to $1.10 a day. They furnish their own lunch at noon, and are usually supplied with something to drink by the farmer. They are as a rule very skilled weeders, bunchers and washers, and tie up a surprisingly large amount of celery in a ten-hour day.

FIG. 350. GETTING READY FOR MARKET

Men do all the team work — plowing, harrowing, marketing — while the women do the trimming, bunching, washing and packing.

Several farmers have washing machines which are very effective and economical. In a general way they consist of two cylinders over which is stretched a continuous carrier. As the carrier moves along the vegetables are placed on it and as they pass from one end to the other, water under pressure is forced on them from above and below through the Skinner nozzles. This washes off all dirt

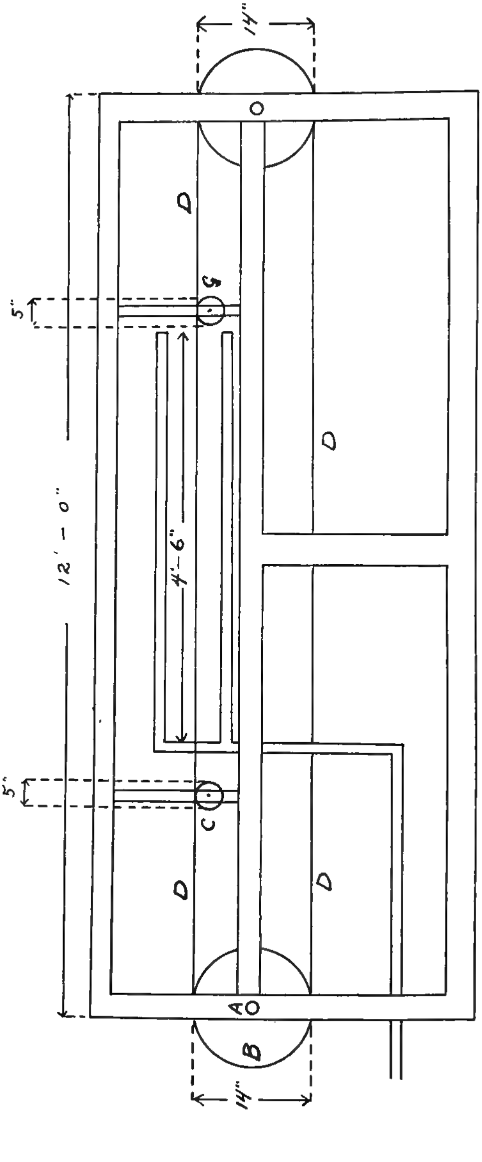

FIG. 351. VEGETABLE WASHING MACHINE (NOT FOR LARGE ROOTS)

A.— One-inch pipe with crank
B.— Cylinder (3 feet long, 14 inches in diameter). Lath used for staves
C.— Rollers to support Carrier "D."

and does not bruise or break off any of the foliage. The machine is turned by hand and as fast as two can feed it two empty the other end and pack the goods in orange crates.

In order to provide work for their help during the winter months, farmers often build greenhouses. With but one exception, however, these are used for flowers instead of vegetables. In this one case the man raises cucumbers. Among the flowers raised are carnations, roses, chrysanthemums, geraniums, asters and ferns.

This system keeps one team on the road all the time hauling manure, coal or produce.

CROPS GROWN

The first crop sown and harvested is the Scarlet Globe radish. Early in the season the Buffalo market demands large green tops but later in the season smaller tops are preferred. Lettuce is sown about the same time but matures a little later. The radishes are tied into bunches and sold by the dozen bunches. Lettuce is packed in orange crates, usually two dozen to a crate, and is sold by the crate.

Although Western New York is famous for the growing of late cabbage, nevertheless this section in order to feed Buffalo must raise a little of everything. Next to cabbage the most extensively raised crops are: lettuce, beets, tomatoes, celery, radishes and cauliflower. Occasionally one will find a farmer who makes a practice of supplying a certain kind of crop to a particular firm. One farmer makes a specialty of parsley for hotels and dining cars, another has an extensive trade in oyster plants, while another has made a specialty of small white onions for pickling.

ADVANTAGES OF HOME-GROWN PRODUCTS

The products of this vicinity do not compete in the Buffalo market with greenhouse or southern-grown vegetables. The people of Buffalo have been educated to demand home-grown goods. This demand has been created by producing a quality of goods which are better flavored than shipped goods. Even muck raised vegetables stand little show beside these upland vegetables. As soon as the home-grown goods come on the market the shipped

vegetables are pushed aside. Many of the grocerymen advertise home-grown vegetables as a specialty.

The seed from which these men raise their crops is largely purchased from the various agents who scour the country. The farmers have learned that the seed companies specialize in their products and they therefore buy these specialties rather than give all their orders to one company. On the other hand, a few farmers raise their own seed. Much of the onion seed is home grown. In fact, "Ebenezer onion" is famous over the state and commands a high price as seed or sets. One or two farmers have been raising their own cabbage seed but they never sell any. One strain of cabbage seed is about twenty years old and apparently as good as ever.

INCOME AND EXPENSE

The income from these farms varies with the seasons and the conditions of the markets. The farmers usually figure on three crops — one to pay interest, insurance and taxes; one to pay the help, and the third for profit. If any one crop fails or is a partial failure it immediately spoils that farmer's chances of mak- a profit. No figures on net profit are available but gross receipts for a farm of ten acres ranges from $5,000 to $20,000 a year. Of course a very large percentage of this is spent for help, since vegetable gardening always requires much care in tilling, weeding, manuring and getting it ready for the market. Very few of these farmers keep cows, pigs or hens so that the products from these animals must be purchased.

MORE DISTANT SECTIONS

The second area of upland truck raising farms lies about fifteen or twenty miles outside of Buffalo. It is difficult to draw crops to Buffalo from these sections so most of the goods are shipped. In the first area every farmer is a gardener with a greenhouse or two on the side, while in the second section many are general farmers raising some vegetables as a side line. There are few real truck raisers who raise vegetables exclusively. Large areas of cabbage, cauliflower and tomatoes are shipped to various points. In this section they have no hold on the Buffalo market

such as the others more favorably situated. They have formed associations which hire managers to look after the shipping and grading of the goods. These farmers also raise much hay and enormous quantities of potatoes. They keep a cow or two, raise hogs for home consumption and have a small flock of hens, usually of mongrel breeds. Nevertheless both classes of farmers are prosperous, each liking their own method of farming better than the other.

2

MUCK SOILS IN NEW YORK: THEIR NATURE AND DISTRIBUTION

Elmer O. Fippin

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Muck soil is made of the partially decayed remains of plants that have accumulated in swampy places. The swampy condition is responsible for their occurrence. Muck soils should be differentiated from those swampy soils that are rich in organic matter but not sufficiently rich so that they are combustible. There is a wide range in the character of such material. The plant substances of which it is composed may be only slightly decayed, in which case the material is fibrous and shows the plant tissues. Such a soil is called peat and because of its high content of organic matter is sometimes used for fuel. Muck soil represents the advanced stage of decay of the organic matter where the material has lost its fibrous nature and become fine and pulverant. All degrees of decay may be encountered and there is consequently a wide variation in the physical properties and, therefore, in the agricultural value of the material.

GENERAL CHARACTERISTICS

The chief characteristics of muck soil may be summarized as follows:

1. It is predominately organic in nature and has a dark brown or black color. The more advanced the stage of decay the darker is the color.

2. It is accumulated under swampy conditions and is naturally saturated with water. The material has a very large capacity for water and will absorb from 60 to 85 per cent. of its volume of water.

3. The shrinkage of the material when it dries is very large. Consequently, when completely drained the deeper deposits may settle two or three feet. Ordinarily the settling is a few inches to a foot or more.

4. The plasticity of the material is low. In the peat material it is especially lacking but is better developed in the muck soil.

5. Muck and peat land is deficient in potash and requires heavy applications of that material for crop production.

6. The climate of muck soil is inclined to be frosty. This results from the position of the material in hollows and from its large water content. Such materials accumulate the cold air in spring, and the warming of the soil is delayed by its large water content.

ORIGIN

The origin of the material is suggested by its primary characteristics. It represents the accumulation of various kinds of plant remains over a long period of years. Upon the death of the plants their materials have been covered by the swamp water where the air is excluded and where antiseptic properties have been developed, both of which hinder decomposition. Decay goes on more slowly than the accumulation and consequently the deposits have been built up from year to year until frequently they have attained depths of 30 to 40 feet. Usually, however, the depth is from 2 to 10 feet.

KINDS OF PLANTS THAT FORM MUCK

There is a considerable variation in the kind of plants that make up muck and peat deposits. They vary not only with different areas but at different depths in the same area. Sometimes they start on the border of a lake and gradually build themselves out over the surface of the water until the lake is filled. In other cases the water is sufficiently shallow so that the first plants find rooting on the bottom and gradually fill the lake with the plant materials. The following types of vegetation have been recognized as responsible for such accumulations:

1. Mosses, including the floating forms that live on the edge of open water. Sphagnum moss is one of the common varieties that contributes largely to the latter stages of muck formation.

2. Grasses and flags. These grow luxuriantly where the water level is near the surface of the land and in time they may form large accumulations. The Montezuma marsh is representative of this type.

3. After the muck and peat has accumulated until it has reached the surface of the water of the swamp and affords a fairly firm foundation, various types of shrub and tree growth develop. When the land is especially wet, cedar and tamarack frequently develops. The latter survives out nearly to the edge of open water.

4. In the latter stages, various hardwood trees are introduced. The more common of these are elm, black ash and soft maple. This latter type of vegetation is generally characteristic of an advanced stage in muck formation. Frequently cedar is interspersed with the hardwood species. The large growth of hardwood trees and of weeds and shrub plants is one of the best indications of the agricultural value of muck soil. When it will support such plants it is very certain to be suitable, with little treatment, for the growth of agricultural crops. Where the vegetation is predominately cedar and tamarack — species rich in resin — the resulting soil is likely to be loose and peaty and has a low agricultural value. It may be that the resinous matter in the wood interferes with decay. Such soil inclines to be dry and has a poor relation to moisture. Where the prevailing timber is hardwood with only an occasional specimen of cedar, the crop value is usually good.

The muck and peat deposits in New York may be divided into two general groups. The first of these is the tide water swamps under the influence of salt water. Flags and grass are the prevailing type of vegetation. They are generally very fibrous and covered by hummocks of plants. The salt water hinders decay. When drained and protected from tidal overflow the salt is gradually washed out by the fresh water from the uplands and from rainfall and the soil becomes favorable for cropping. Areas of this soil have been developed on parts of Long Island.

The other type is the fresh water swamps in the inland part of the state. Some of these are broad, shallow sheets of muck and peat soil while others are small deposits often of great depth. There is often a considerable difference in the agricultural value of these two types. The first, when drained, is likely to suffer seriously from the lack of water because of the poor moisture relations of the material and the fact that the water-table may be too far

below the surface. The smaller areas are often bordered by numerous springs which even after drainage keep the water-table fairly near the surface. Such areas are likely to have higher agricultural value.

The wide variations in the character of muck and peat soil are due to the kind of plants of which it is formed and the stage of decay. The stage of decay varies not only with the area but at different depths in the same area. Where the water level has been permanently at or near the surface, the surface soil is a better quality of muck than the subsoil which is likely to be quite peaty. In other cases, however, a better quality of muck soil is found below the surface than at the surface. It is possible that this represents changes in the drainage condition of the area. Some recent obstruction of drainage may have raised the water level and thus renew the process of peat formation. In the deep areas the lower part of the formation is likely to have lost its peaty nature and it sometimes takes on a dark grayish color and a flaky nature. When thoroughly broken up by tillage such material may make good soil.

There is a considerable variation in the underlying material of muck bogs. In every case the ultimate foundation is a clay or some other compact formation which retains the water. Above this there may be a strata of sand, and in the New York areas, especially through the middle part of the state from Buffalo eastward, deep accumulations of marl are common. These marl deposits are made up chiefly of lime carbonate. Shells of mussels are abundant but the origin of the material seems to be due to the growth of a certain type of moss which precipitates lime carbonate from the swamp water. In a number of the deposits south of Rochester, the marl is many feet in depth, is of very great purity and is covered by only a thin layer of a few inches to a foot or more of muck. The purer deposits are sometimes used as a source of lime carbonate for the soil, for which purpose when dried and pulverized they are entirely satisfactory.

PROPORTION OF ORGANIC MATTER

Special properties. Muck and peat soil contain from 50 to more than 85 per cent. of organic matter. Usually the more peaty

the deposit the higher is the proportion of organic substance. The process of decay consists partially in the destruction of the carbonaceous material. The process sets free carbon to which is due the brown or black color of the material. Consequently the muck deposits which represent the more advanced stage of decay have the darker color. The muck also has the accumulation of the ash material which increases its content of potash and other mineral elements. The decay also increases the proportion of soluble material which may be grouped under the general name of humus. The spongy nature of the plant tissues as well as the gelatinous nature of the humus gives the material a very high water capacity which amounts to from 300 to 1,000 or more per cent. of its dry weight. Fresh peat may weigh only 10 to 12 pounds per cubic foot when freed of water. Muck soil has a larger weight and will run from 12 to 20 pounds. The smaller the weight of the dry material per cubic foot the greater is the skrinkage, and this is one indication of the crop value of such land. Material that has an excessive shrinkage should be avoided, especially for intensive cropping, until it has reached a more advanced stage of decay.

CHEMICAL COMPOSITION

The chemical analysis of a large number of samples of muck shows them to contain from 1¾ to 2½ per cent. of nitrogen, from one-tenth or less to five-tenths per cent. of potash. They may also contain from ¼ to ½ per cent. of sulphur. The nitrogen is derived from proteid compounds in the plants. There are no nitrates or nitrites in fresh muck soil and very little free ammonia. The bulk of the nitrogen is in the form of a memo- and mono-ameno compounds, and in the peaty materials a few per cent. of the nitro-compounds, and in the peaty materials a small percentage of the nitrogen may be dimeno- compounds. Under treatment with basic genous organic compounds break down and the ammonia is set free. It is essentially this process that occurs during decay and for that reason muck soil in an active stage of decay is a better medium for plant growth than raw material in which decay is not active. This affords a cue in the management of such soil.

After drainage, which is the first step, decomposition should be promoted by applications of manure or of rich garden soil. Such material is in the nature of an inoculation.

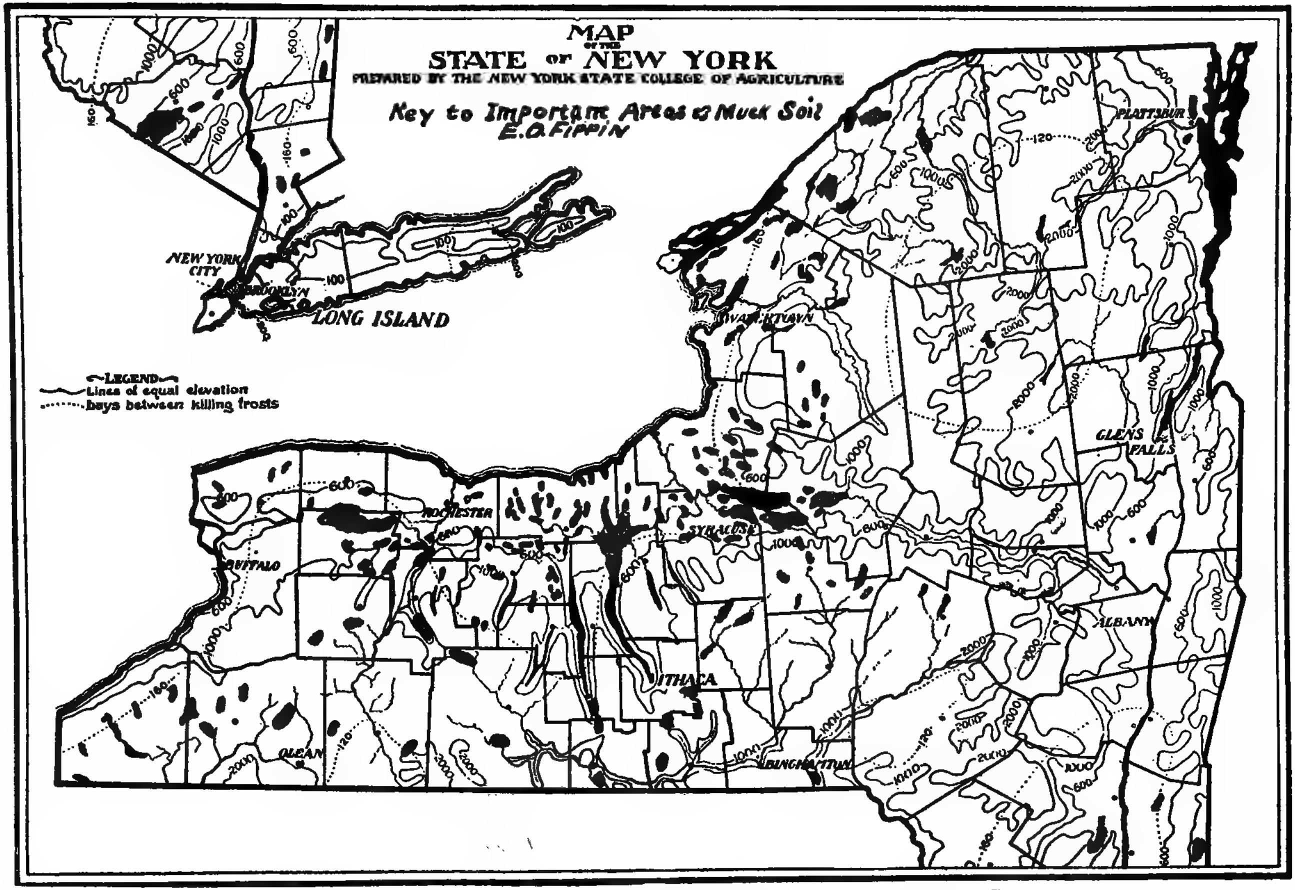

FIG. 352. MAP SHOWING IMPORTANT AREAS OF MUCK SOIL IN NEW YORK STATE

OCCURRENCE

There are in New York State from 800 to 1,000 square miles of muck and peat deposits, and, as suggested above, these are distributed in a large number of areas. They range from areas an acre or more in extent to large sheets containing thousands of acres. Such deposits are most abundant in the northwestern part of the state adjacent to Lake Ontario. A few areas are developed in the southern, eastern and northern part of the state. They are associated with the rough topography where drainage has been much obstructed by glacial action and many of the former lakes and ponds have been filled by accumulations of this sort. The larger areas are found in the Conewango valley in Chautauqua county, in the Caneserago valley in southern Livingston county, the Oak Orchard swamp in northern Genesee county, the Montezuma marshes at the foot of Cayuga lake, Cicero swamp southwest of Oneida lake, Pope Mills swamp, southeastern St. Lawrence county and the Wallkill marsh in the southern part of Orange county. The distribution of such lands is suggested on the accompanying map.

IMPROVEMENT OF MUCK LAND

In the reclamation of muck lands, the following steps must be observed:

1. Drainage. The water level should be lowered to a depth of 15 to 30 inches below the surface. Usually, open ditches are employed and may be combined to form extensive canal systems. It is usually desirable to extend the bottom of the small field ditches below the desired water-table in order to quickly remove the water after heavy rains. A check gate should be installed to avoid the excessive lowering of the water. As noted above, the capillary relations of such lands is deficient so that drainage should be carried out only to the extent necessary to start crops in the spring. The large shallow areas are most critical in this respect and are likely to suffer seriously from lack of water in the late summer. The depth to which the water-table should be lowered depends very much upon the quality of the muck. The more pulverized its character the deeper should the water-table be held. Those small areas fed by springs, and by which the water-table is maintained

at the bottom of the ditches, are most favorable for agricultural purposes. Underdrains of tile or board boxes may be used in those areas where the water-table is permanently maintained at the level of the base of the drain. This prevents the excessive and unequal shrinkage that is likely to throw the drain out of line. Open ditches are the safer form of drainage and should always be used at the beginning of operation. In a few places in the state under conditions mentioned above, tile drains are operating successfully in muck soil. Of course if the muck is sufficiently shallow so that the tile can rest on the solid material below the muck, the use of underdrains is much preferred to open ditches that seriously interfere with tillage operations. In other cases irrigation in some way may be very desirable to secure full crop yields. In some cases it is possible to utilize spring water in connection with open and underdrains as a means of sub-irrigation.

2. Applications of lime in the form of caustic lime are frequently beneficial. The decay of organic matter produces an acid condition which tends to hinder further decay. Lime not only promotes decomposition but aids in chemical changes of the material that liberates plantfood. One or two tons per acre should be used. Many of the areas in the western part of the state that are associated with marl deposits near the surface probably would not be benefited by applications of lime.

3. A light application of well-rotted stable manure or of rich garden soil serves as an inoculation to promote decomposition.

4. Thorough tillage loosens up the soil and exposes it to aeration and promotes decomposition. Since the material is inclined to be loose, plowing in the fall is preferred where there are no dangers from serious washing. The winter saturation aids in compacting the material. The tillage operations should be aimed to compact the soil which improves its moisture relations.

5. Commercial fertilizers should be rich in potash and should contain a moderate amount of phosphoric acid and nitrogen. The proportion of these will vary considerably with the deposit and the crop. Perhaps the best standard fertilizer in the early stages of cultivation of a muck area should contain from 2 to 3 per cent. of nitrogen, from 4 to 6 per cent. of phosphoric acid in the form of acid phosphate, and from 12 to 20 per cent. of potash.

6. A wide variety of crops may be grown on such soil. Its natural capacity is indicated by the native vegetation. The more peaty deposits will change into muck after cropping and tillage. The high percentage of nitrogen available in well managed muck soil makes it especially suited to crops that are used for their vegetative growth. In addition to vegetables this includes hay, especially timothy, roots and potatoes. With proper fertilization fair yields of corn may be secured. Even bluegrass has been observed to make a good growth on muck soil, presumably areas rich in lime. In the early stages of the development of muck land it is advisable to plant only the stronger feeding field crops such as hay, corn and potatoes. The tillage of the latter aids in breaking up the soil in preparation for the more delicate feeding roots of the vegetable crops. The more sensitive crops should be planted only on the best quality of muck land.

GROWING VEGETABLES ON THE MUCK LANDS

PAUL WORK

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Though in some sections muck lands have been utilized for vegetable production for several decades, it is only recently that their usefulness has been generally recognized. In most places the swamp on the farm has been regarded as a dead loss. Of late years the movements of vegetable products have ceased to be exclusively from warmer to cooler climates. The states which supply early vegetables to the northern cities find that they cannot produce certain crops for their own use in summer and fall. Accordingly, they must look to other sections.

For the crops which prefer a cool season, the muck lands have proved to be peculiarly adapted, and a large share of the onions, celery and head lettuce which are used in summer, fall, and early winter are grown on these soils. Other crops are grown to a lesser extent, but greater diversification is being practiced every year. Among the additional crops are spinach — chiefly for canning — beets, carrots, cauliflower, potatoes — chiefly for seed — and to some extent cabbage. It is often said that the latter is not solid when grown on muck, but some growers have attained excellent results.

Muck land that is fully developed is usually held at high valuations. In some sections areas have changed hanus at as much as five or six hundred dollars an acre. Rents as high as seventy dollars per acre per annum have been recorded. But muck land can be purchased at much lower figures, and one who is seeking a location should cast about for an investment where the interest charge will not be so high. It is necessary to exercise caution to avoid areas that are distant from railroad, or in which the soil is for any one of several reasons unproductive, or where the cost of reclamation would prove excessive.

EQUIPMENT

The investment in equipment for muck land vegetable production varies greatly. Some growers with relatively small areas are highly successful though their tools are few and simple, representing less than three or four hundred dollars for — say ten acres. The buildings may be very simple, providing merely shelter for tools and a room for preparing products for market. Small and simple green houses are used by celery men for growing early plants. Storage houses for onions are frequently built, but this is really independent of crop production, as the gain incident to holding the crop is expected to meet the interest charges and other costs and to offer a profit in addition. Some men build more elaborate storage houses and expensive tool and work rooms, and so increase their investment rather heavily, not always with increased profit.

DRAINAGE

The care of drainage ditches on the muck land involves special consideration. Two general methods are in practice. Most growers maintain a narrow strip of sod, or rather a strip of sod which they pretend to keep within narrow limits, on each side of the bank. Thus the sides may be kept almost vertical. The other method consists in keeping the banks of the ditches shaved clean, thus allowing no harbor for weeds. Each requires about the same amount of space.

There is a growing tendency toward the use of tile drainage instead of open ditches. The latter are objectionable on account of the loss of space, often as much as 10 per cent.; the labor of keeping them shoveled out from year to year; their interference with operations, and on account of the harboring of weeds. It has been found that where tile is well laid, placing the line on a board bottom, the plan is satisfactory, even through the fall is very slight.

Muck soils do not form clods as do the heavier upland soils. Even though the material is very light, plowing is not as easy as might be supposed. The smallest spot of rust on a plowshare is sufficient to start an accumulation of muck which prevents scouring, and before long the implement is merely dragged through the soil without turning a real furrow. Considerable care must

be exercised in selecting a plow for these lands, some models being much more satisfactory than others, although there is quite a little difference of opinion as to the adaptability of different makes and shapes. Some are using disc plows with a high degree of satisfaction.

FALL PLOWING AND CULTIVATION

Fall plowing is favored by some gardeners, advantages suggested being that the work is done and off the calendar before the rush of the spring months; that the land plows a bit more easily; that freezing in the furrow is useful, and that there is less trouble from weeds. On the other hand, some claim that spring plowing aids in drying out the soil more speedily.

Great emphasis is placed upon the advantage of careful preparation of the soil. A level surface is especially important on account of the delicate seeds and plants. On one of the experimental plots of the College of Agriculture, a small area was found to be deficient in yield. The situation was studied a bit, and it was discovered that a very slight depression existed at this

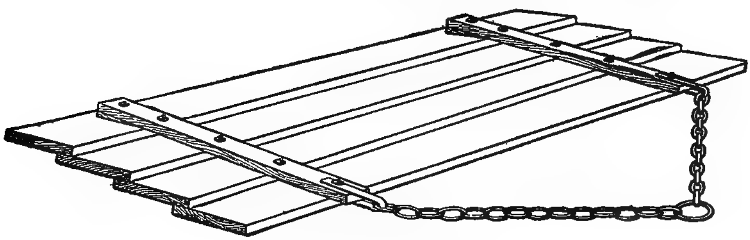


FIG. 353. PLANK DRAG

point. After this was filled, it was found that the difficulty had been overcome. The plank drag or float is widely used, and some employ a scraper consisting of a plank so attached to a frame that the edge acts as a blade reducing mounds and filling depressions. The roller is regarded as very valuable for compacting loose muck soils. The Acme harrow is one of the favorites for finishing.

This bulletin includes articles on the leading muck land crops, and each deal with their special fertilizer requirements.

The peculiar moisture relations prevailing in muck soils render careful cultivation no less necessary than on other soils, even though the water-holding capacity is exceptionally great. The

capillary movement is so slow that the upper soil may be suffering severely when abundance of water is to be found a few feet beneath. Thus the conservation of the moisture which exists in the parts of the soil where the roots are most highly developed is not to be neglected, and cultivation usually insures sufficiently favorable moisture conditions for high production without irrigation, although some practice artificial watering.

The maintenance of a surface mulch on muck soil is exceedingly easy. The material itself is well adapted for the purpose; in fact, the coarser muck soils would be found effective for the mulching of other soils. Only a very light crust is ever formed, and the lightest tools are adequate. The intensive planting plans practically banish the horse cultivator on many farms, celery being the only important crop for which it is used. Wheel hoes are very widely employed. Different attachments are used at different stages of the crops, among them being sets of small discs, of light, slender teeth, mold boards which throw a considerable amount of soil to or from the row, and also blades which pass just beneath the surface, cutting weeds and leaving a fine mulch. A two-wheeled tool is best for straddling the rows, while a single wheel is better for working in the middles. When crops begin to close the middles, a single wheeled tool, known as the gooseneck, is used. The frame consists of a single bent tube, and it carries a blade which passes immediately beneath the surface.

The most widely used of the hand tools is the scuffle hoe or shove hoe, as it is commonly known. This consists of a handle, a shank, and a flat blade similar to that just described from one and one-half to three inches wide and from six to twelve inches long. The shank is riveted to the blade in such a way that it is pushed in a horizontal position ahead of the worker. This passes readily beneath the foliage and is exceedingly useful in this type of soil. Ground may be covered very rapidly. Another tool that is used for thinning and for working beneath plants in the row is a hoe which consists merely of a narrow strip of metal bent in the form of a triangle and set in a handle.

An enormous amount of hand weeding is necessary for closely planted crops. Especially is this true of onions and of celery.

When heavy winds have drifted the muck so that young celery plants are partially covered, the soil must frequently be removed by hand.

IRRIGATION

As just suggested, most growers are able to procure a good crop by the conservation of moisture through good cultivation. However, an increasing number feel that the losses incident to drouth are sufficient to justify the installation of irrigation equipment. The overhead type of irrigation is but little used. Many control the water table by opening or closing the outlets of the ditches. The water level may be raised quite high before planting a crop, thus filling the soil with moisture. It is then lowered and maintained at a level of say eighteen to twenty-four inches. An occasional grower employs a furrow system, distributing the water from a head ditch through the middles. This scheme is quite satisfactory if the pumping cost is not high. It is a little difficult to secure even distribution of water throughout the whole length of the ditch. The water ought to be so handled as to flow from one end to the other very promptly. Then it will be gradually absorbed all along the line.

CROPPING PLANS

The arrangement of crops on muck land varies greatly in different districts. In some places single crops are grown almost exclusively. Thus the marshes of the Wallkill river in Orange county are used chiefly for onion production; the same statement may be made of the Canastota swamp; Fulton and Albion have been widely known for their lettuce, and Arkport for its celery. However, there is a marked tendency toward diversification. Except in the warmest parts of the state, it is difficult to grow a second crop after onions have matured, although some are willing to take a chance on securing a good yield of spinach, since the cost is very low. Two crops of lettuce may be matured without difficulty, and in some cases three. Celery is sometimes sowed after a crop of lettuce or vice versa. Occasionally lettuce is planted every fourteen inches apart, but every third row is omitted. In this wide space the celery plants are set. Thus the two crops occupy the ground together for a

few weeks. A double row of lettuce is sometimes sown on celery ground after the boards have been placed for blanching, but the removal of the celery renders this more or less unsatisfactory.

MARKETING

Muck lands seldom lie within hauling distance of the market, and the different problems of transportation and of sale through dealers and commission men must be met. The muck land grower seldom sees his merchant face to face, and the long time in transit usually prevents his taking full advantage of the ups and downs of a particular market. In fact, it often happens that on advice of a high market, growers ship just in time for their product to contribute to an over-supply incident to the wide distribution of the information which they have received. It is needless at this point to dwell upon the problems of selling on distant markets. Suffice to say that men who are producing in fairly large quantities and who are using good business judgment in working out their market problems are able to secure fairly satisfactory results. Nevertheless there is something radically wrong when celery that can be profitably grown at one and one-half cents per head costs the consumer eight or ten cents, and when lettuce from western New York makes it way to Boston and back to Syracuse before it even falls into the hands of a retailer.

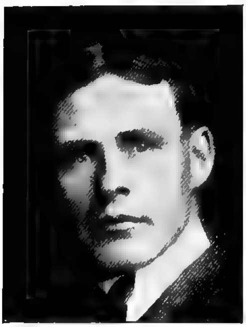
Some growers have found it profitable to build up a clientele of small jobbers and larger groceries to whom they ship directly. They have given special attention to the growing of a high-class product and to its preparation for market. This plan involves much attention to detail and is for this reason not favored by some.

Muck land production offers exceedingly favorable opportunity for cooperative marketing. No notable success in this direction has been recorded on any of the muck land areas of New York, although the upland growers of Chautauqua and Erie counties are finding the South Shore Growers' & Shippers' Association exceedingly helpful.

THE CANNING INDUSTRY FROM THE GROWER'S STANDPOINT

S. J. Cook

Secretary-Treasurer of South Shore Growers' and Shippers' Association, Silver Creek, Chautauqua County, N. Y.



The growing of fruit and vegetables for preserving and canning in the United States and Canada has, in the last ten years, become an important industry. Hundreds of factories have been erected in many states, and hundreds of thousands of acres are devoted each year to the growing of canning crops. There were packed in the United States in 1914 approximately 25,000,000 cases of the three vegetables — corn, peas and tomatoes — and approximately 4,500,000 cases in Canada. These, coupled with other important vegetables, such as string beans, beets, asparagus and kraut — to say nothing of the berries of all kinds, and other tree crops — give one an idea of the magnitude of the canning industry in this country.

All manner of men are engaged in the undertaking, and there are all kinds of canning factories — from the cheaply constructed shed to the enormous, up-to-date, sanitary establishments constructed of concrete, brick and iron, covering acres, and capitalized by large corporations with millions at stake. No industry has made greater advancement in the manufacturing of its products. Inventors, expert machinists and manufacturers have designed and perfected the most modern machinery for the manufacture of canned products. A few of the larger preservers and canners manufacture their own bottles and cans. There is also great improvement in the matter of sanitation; likewise in the quality of the finished products. Many of the larger plants invite public inspection.

Much publicity has been given the merits of canned fruits, which has had a tendency to increase the consumption. A large part of

the population in the cities depend almost wholly on canned goods the larger part of the year, and the canning business has grown beyond the expectations of the best informed men in the business. Undoubtedly, it will continue in its growth. That the business has proven profitable is to be seen by the large fortunes acquired by those interested in canning and preserving.

The canning business of this country represents enormous crops, wonderful manufacturing output, superior salesmanship, and, while the cost of staple articles of food is ever increasing at an alarming rate — notwithstanding all the efforts that have been made to increase the production of the soil — such increase in the cost of living cannot be laid to the canner. On the other hand, he is a public benefactor.

There are exceptions to the rule, however, in the canning business. What I will say now represents the grower's interest and the unfairness on the part of the canner in his business dealings with the grower, and I trust that it will not be taken as antagonistic. We, as growers, are all interested in the welfare and advancement of the canning industry in this state, and are in a large measure dependent upon the canneries for the sale of our products.

RELATION BETWEEN THE GROWER AND CANNER

The canners have made it possible for us to grow thousands of tons of perishable fruit and produce, and that at a contract price; but have they always been just and fair in their business dealings with the grower? I think not. On the other hand, has the grower always been fair with the canner; has he delivered all of the crop contracted for? No, he has not. I shall say something in regard to this later.

Where climatic conditions and soil are adapted to the culture of such crops as tomatoes, peas, corn — in fact all vegetable crops — and a fair price is paid by the canners, many growers have made money. But, on the other hand, there are localities where canners and perservers have taken advantage of individual growers in price cutting, unfairness of contract, failing to furnish crates to harvest and deliver the crop, refusing to pay the grower for his produce until the canned products were sold, thereby making the grower help finance their business — in fact their contracts

with the growers were often "jug-handled" affairs. They were in position at all times to dictate in the matter of contracting for tomatoes. If the grower's crop happened to be late and the canner had received from other growers about all the tomatoes he cared to pack, he would at times refuse to receive any more tomatoes under any consideration, although the quality of the fruit might have been of the best. The same holds true with corn, peas and some other crops.

Contracts for produce are generally made with the grower two or three months previous to the planting of the crop. If the canner desired a large acreage of peas and the contracts were not forthcoming from the growers, he would refuse to take a contract for tomatoes, unless the grower agreed to contract for a certain acreage of peas, or vice versa.

There are many other instances of unfair treatment, such as having to wait long hours in line when making delivery, and, after having done so, have the inspector inform you that he would be obliged to cut you two or three dollars a ton on the load as the tomatoes were not as perfect as they should have been and did not conform to the contract. I have had my own load of tomatoes turned down for no other reason than to help eliminate the large loss which was occurring daily on account of deterioration of the fruit, the canner being unable to properly care for the tomatoes. The accumulation of a large over supply at such times invariably caused a loss which the grower was asked to help sustain. Such discrimination and unbusinesslike management on the part of the canner has had a tendency to create great dissatisfaction, and where growers are obliged to stand for treatment of this kind there is not a likelihood of making much money in growing tomatoes for the canneries.

The grower, as an individual, is not in position to make demands on the canner; he will be given to understand that he is not running the canning factory — in fact, he is not taken into serious consideration. If he does not like the treatment accorded him he can, of course, refuse to contract next year, but that does not help the present situation.

What I have said of unfair treatment of the growers by the canners is, undoubtedly, the exception rather than the rule, but in

dealing with canners of the type mentioned many growers have made but a scant living, and have not received an adequate return for their labor or investment.

The growers in this locality found that the whole solution of their troubles was to cooperate, which they did.

ADVANTAGE OF COOPERATION

By cooperation the growers bettered all conditions. They received one dollar more per ton for their tomatoes than they had been previously paid and were given a better contract. In this contract the preserver agreed to receive all marketable tomatoes to a certain date, and further consented to a two-payment clause in the contract — payment for one-half of all tomatoes delivered up to September fifteenth, and the balance within ten days after the remainder of the crop had been delivered. They also agreed to furnish packages. In fact they were much more congenial and businesslike than they had been, and there was really a change in business, which was, I believe, for the good of all concerned.

Cooperation is a necessity in some localities; growers have been compelled to either "get together," or go out of the business. Canners as a rule do not advocate dealing with a cooperative association; in fact they have been more or less antagonistic. But I believe the time is not far distant when they can be made to see the efficiency and wisdom in doing so — as soon as it can be shown that a policy of this kind takes into consideration fairness to the canner.

If the growers are to demand fair play they must in turn do their share, and while an association is, undoubtedly, in a better position to maintain a fair price for its products and demand fair treatment for its members, it should at all times apply good sense in conducting its business. We must not ask an exhorbitant price; the canner must receive the raw products within certain limits of cost, and the treatment accorded him should be in the light of a prospective partner. Further, we should make no distinction in the matter of fair dealings between that accorded the canner and our own members. We should deliver good quality produce, goods that would please, rather than to try to get rid of poor, unmarketable products.

The growers have not always been fair in matters of this kind. They have at times tried to deliver any but quality produce, filling bottoms of containers with poor rubbish and topping off with standard grade fruit. They have also shipped large quantities of contract produce to the open market at an advanced price, and at other times have overloaded the canneries with a large supply that possibly came from an adjoining field and was not contracted — in direct violation of their contract.

A cooperative association must have some rule of fairness; must have a reputation for fair dealing; must be dependable and have fixed business principles which serve both the buyer and the seller. Our plan is to enter into an agreement with the canners and preservers for a specified number of acres of produce at a stated price. The conditions governing the contract cover varieties, delivery, loading station, baskets for delivery, right of the canner to measure acreage, quality of fruit or produce and terms of payment.

In the matter of contracting with our members, each one is required to sign a binding contract specifying acreage and agreeing that all produce marketed at canneries shall conform to the standard and conditions as set forth in the contract made between canneries and the association. We found it was necessary to have a stringent contract.

With us cooperation has made possible better business methods. It has likewise been a benefit to the canner. He now receives better quality produce; he is not disappointed in his acreage by being informed at the last minute that the grower failed to plant his crop; his expense in securing acreage with the individual growers is lessened, and improved methods of production and grading have given him better uniformity, which has greatly improved quality. The management has interested canners and preservers in distant cities and towns in the purchase of our products. This has increased the acreage in production from year to year, which has added to the prosperity of the growers, and all classes of our citizens have shared in the prosperity. The railroads have profited by the increased freight tonnage resulting from industrial activity, based on agricultural prosperity; manufacturers of farm

machinery and implements have been interested; the manufacturers of commercial fertilizer have greatly increased their tonnage in this territory; and the retail merchants who sell to the farmers, likewise the banks, receive their share by the increase in business. In the past three years we have demonstrated that cooperation for the growers will furnish an agency strong enough to control their products from orchard or field to market.

CANNING ON THE FARM

C. O. Warford, Newburgh, N. Y.

ADVANTAGES OF A FARM CANNING OUTFIT

Have you ever noticed how two men with practically identical loads of vegetables will go to the same market, and when the market closes and their loads are sold out, one man will have in his pocket as the result of the sale thirty dollars, while the other man will have but twenty or twenty-five?

We say it is good salesmanship, but is it? Perhaps it is, but many times you will find back of it all another and a better reason, and that is confidence. One is given confidence because he is the possessor of a canning outfit and knows that if

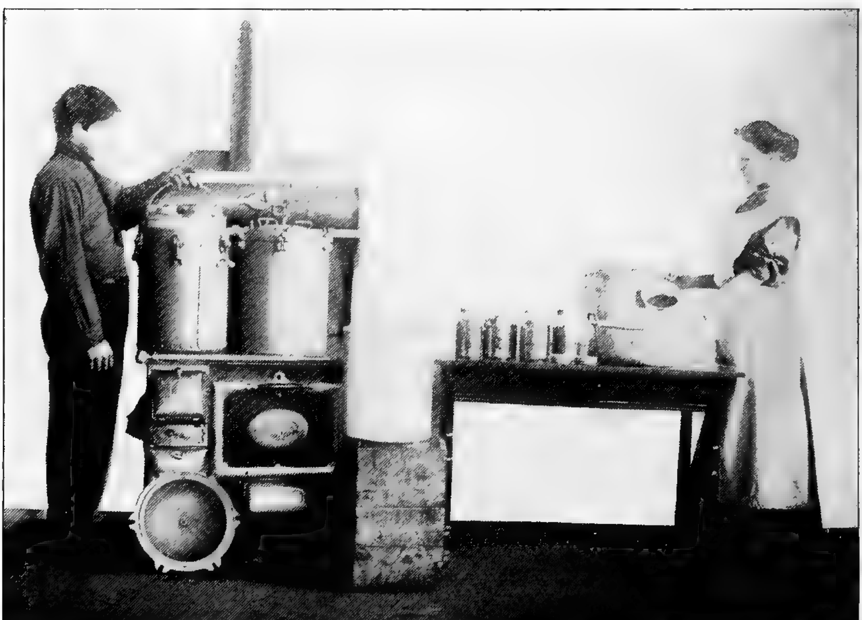


Fig. 354. — A Canning Outfit in Operation

he holds his goods rather high in market and the buyers pass him by he can take the vegetables back home and can them at a profit, while the other man who has no canner knows that if he does not sell his goods on the market he will have to dump them somewhere at a dead loss. The consequence is that he takes about any price the purchasers care to offer him.

The ownership of a home canner gives a man backbone when he goes to market. In all transactions it is a principle well established that one or the other sets the price. A willing buyer makes a fair-priced article while an anxious seller reduces the purchase price. In all lines but farming the seller sets his price

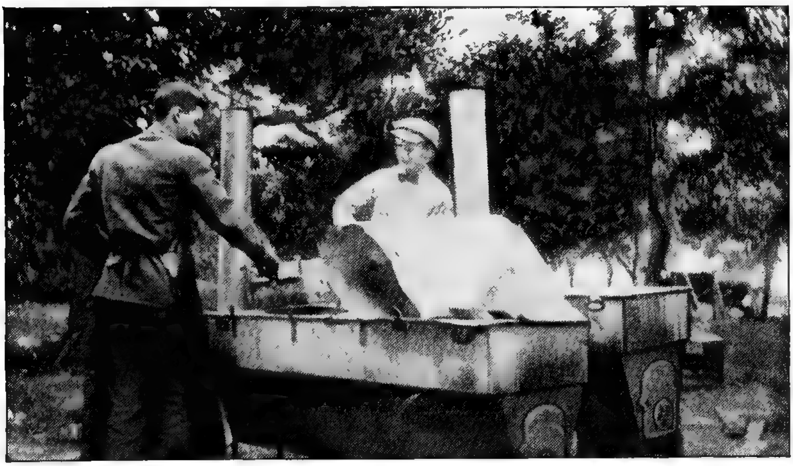


FIG. 355.— EVERY ONE BECOMES USEFUL IN THE CANNING SEASON

which will cover the cost of production, but when it comes to the sale of farm produce many times it seems as though this rule was reversed, for the price seems to be set by the dealer who says, "I will give you so much." And because the producer has no other place to sell, nine times out of ten he will take the price that is offered, even though he may know it is below cost of production. Then he will go back home to produce more goods at the same low offering. This I believe is wrong. I believe that every grower is entitled to a price that will cover cost of production, and the home canner will help him obtain it.

The possession of a home canner makes a home market that will cover cost of production, and whenever the city market offers

less than this cost the owner can refuse to sell, take his goods back home, set his canner at work and get a fair return for his crops and labor.

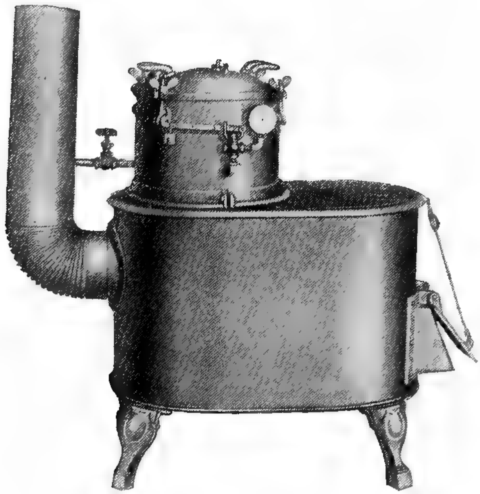


FIG. 356.— STEAM-PRESSURE CANNER WITH FIREBOX. FOR CANNING IN MEDIUM SMALL QUANTITIES, EITHER INSIDE OR OUTSIDE THE HOUSE

Another great advantage of having a home canning outfit to care for the surplus is the fact that the fruits and vegetables in the can keep the grower's name before his customers all winter when he is out of the market with his fresh stock. Many men grow only crops that are marketed through a period of three or four months in the summer and then they drop out of the market for the remainder of the year. During this time their regular customers forget them and when they start back on the market next season they are practically strangers. With home canned foods to place on the market all winter their name is kept before the consuming public, and when they start back next season everyone knows the farmer who produces fresh farm products in summer and canned foods in winter.

But best of all, the home cannery helps reduce the cost of living, for it is one of the means of saving waste products. By waste products I do not mean cull or defective fruits or vegetables, but fruits and vegetables that are not just in the condition that the market demands. For instance, a man may be shipping tomatoes to market; for this purpose he must have them partly green. A dead ripe tomato in this case is a loss for it will not stand shipment, while a tomato of this kind is in the very best condition for canning, since it has the color and the flavor.

Canning saves this. In bunching beets the small ones have to

be thrown out and these are the very best for canning as they are the most tender. Broken stalks of rhubarb are unsalable but they are perfectly proper for canning. Canning these waste products is true economy and if saved on every fruit and vegetable farm in the United States would add many million dollars to our national wealth each year and fill many hungry mouths.

EQUIPMENT

A person who wishes to try out the matter of home canning need not go to the expense of spending many dollars for an outfit. Anyone can try out the problem at an expenditure of less than five dollars for equipment. Every farm supposedly has a wash boiler or if that is not to be obtained a common farm kettle may be used. Hot water is the great requisite. The capacity of any outfit, either for home or commercial canning, is the amount of water that can be boiled in a given time.

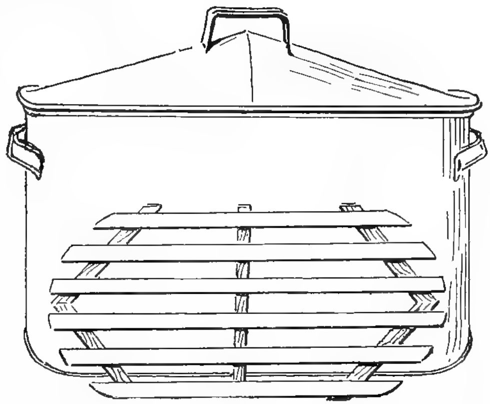


FIG. 357.— THE CLOTHES BOILER USED AS A STERILIZER, SHOWING FALSE BOTTOM AS A RACK

Suppose, for instance, one wishes to can tomatoes. He must have some place where he can wash the raw tomatoes as they come from the field. On a small scale this can be done by placing them in a tub of clean water, stirring them and then removing. They are then ready for the scalding. For this process they are placed in a small wire basket — a clean market basket will do — and the basket is dipped in boiling water. It should be worked up and down several times until the skins of the tomatoes show small cracks in places. Any boiler or farm kettle will do for the purpose of holding and heating the water for scalding.

Next in order is the peeling. A clean table is needed for this on which may be placed pans large or small for emptying the scalded tomatoes so that those who are to peel may work to advan-

tage. Peeling is somewhat of an art. A short knife with a blade about two inches long is the best tool. The peeler grasps the tomato in the left hand with the stem end away from the palm, the blossom end lying in the palm of the hand. The knife should be held as nearly parallel to the line of the core as possible, and should be run into the tomato only deep enough to remove the core without opening up any of the seed cells. If the tomato has been properly scalded, as the core is being removed, the skin will leave it and be left in the palm of the hand when the tomato is dropped into another pan which is used to hold the peeled stock.

Next the tomatoes are packed into cans, after the cans have been thoroughly washed. In packing the tomatoes a small quantity of the juice from the peeled stock is first placed in the bottom of the can — about two tablespoonfuls of juice is about correct — to fill the spaces between the tomatoes as they are placed in the can. If this juice is not placed in the bottom of the can it is almost impossible to have the can turn out full when cut and emptied.

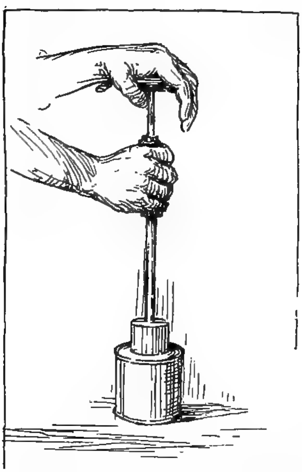


FIG. 358.— CAPPING A CAN WITH ROUND CAPPING STEEL

Next in order after filling is thoroughly washing or wiping off the tops of the cans. If this is not done the operation of capping or soldering the top in place cannot be properly performed. Next the cap or so called top of the can is soldered on. When purchasing cans the little tops or caps which cover the openings in the ordinary cans should be ordered sent with solder enough on their edges to fasten or seal them to the cans.

Soldering is performed as follows: A tool is used, called a capping steel, which exactly fits over the cap to be soldered on the can. It is heated to the required temperature either by a plumber's gasoline furnace or by a charcoal furnace. The latter may be a homemade affair made by cutting a hole in the side of an old milk can so an opening

may be made large enough to cause a draft and accommodate the soldering steel. The caps or tops are placed on the cans where they fit into little grooves made to receive them and hold the solder. After the caps are in place, a few drops, about three, of what is known as soldering flux is lightly brushed along the edge of the cap and over the solder to facilitate the flow of the solder and make a smooth finish. This flux can be purchased ready-made quite cheaply or may be made at home, but the commercial article is always purer and better owing to the superior facilities the manufacturers have for making it.

The cans now are ready for soldering. If the capping steel is at the required degree of heat it is taken from the furnace and dipped into a powder or mixture made of some scraps or pieces of solder and granulated sal ammoniac. If the hot steel is turned around in this mixture several times it will come out covered with a bright silvery film of solder. A further dipping into a can containing some of the soldering flux before mentioned, or even a wiping off with a damp cloth will add to the cleanliness of the steel and help make a better job of the capping.

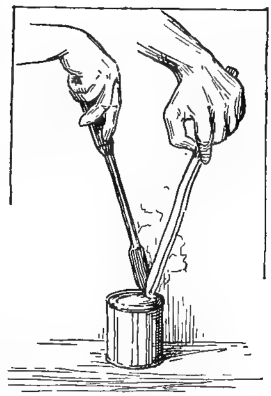


Fig. 359.— Tipping a Can With Soldering Iron and Solder

Now insert the rod which comes with the steel and cover the can cap, revolve the steel once or twice over the solder, lift the steel, holding the cap in place with the center rod until the solder cools and you will find the cap firmly fastened in place. In the center of each cap is left a little hole or vent. This can now be soldered up and the cans be given the final cook, but the best and most approved way is to place the cans in boiling water, leaving the centre hole or vent open. Immerse the cans in the water so that only about a half inch of the top is sticking above the water. Leave them in the water about three minutes. This is what the canners call "exhausting," meaning expelling the air from the cans. As soon as the cans are placed in the boiling water the heat penetrates the contents with the result that they expand, forcing the air from the can. The cans should then be removed

and the little hole or vent closed at once with a drop of solder, after which they should be returned to the same or another kettle for their final cook or "process" of thirty-five minutes, the time of process being taken from the time the kettle again starts to boil after the cans are placed therein.

When goods are removed from the kettle at the end of the thirty-five minutes a stream of water should be turned on the cans to rinse and in a measure cool them. When the cans are cold the ends will be found to be concave, due to the fact that the air forced out by the exhausting left a vacuum when the cans

FIG. 360.— GIRLS OF THE NEIGHBORHOOD WERE CALLED IN TO HELP

cooled, and the atmospheric pressure from the outside keeps the ends pushed in place. If the exhausting had not been done the goods would have kept just as well, but the pressure on the inside and outside would be equal when the can cooled, resulting in the ends not having the finished appearance which they should have, and good appearance is a great factor in marketing any product.

Of course there are many machines for performing each of the several operations in canning but these machines cost money and

a person with ordinary intelligence can many times pick up about the farm articles enought to make a fair homemade outfit which, although not quite so convenient, will do as good work — so far as quality of product is concerned — as any of the highest priced commercial outfits. Quality of product in canning depends more upon the man in charge of the outfit than upon perfection of machinery employed in the various operations.

It probably will be necessary on the ordinary farm to purchase the capping steel and the tipping copper, total cost $2.50. The natural ingenuity of the farmer will suggest the rest. Whatever outfit is secured, homemade or commercial, the idea of cleanliness should be paramount.

CLEANLINESS AND BETTER DISTRIBUTION

The keynote for the owner of the farm cannery should be "improvement of quality of product." Make "quality" the motto, and increase of demand and output is sure to follow. As soon as a person learns the business and its possibilities he will not be satisfied until he has an up-to-date cannery with all the improved sanitary machinery. The method of preparation and process for tomatoes applies practically to all fruits and vegetables with the exception that the cook or process for the fruits varies somewhat, being twenty minutes for pears, fifteen for apples and about the same time for berries.

Other vegetables require a longer time than tomatoes and some of them need a higher temperature than boiling water, which high temperature can be obtained only by using closed top pressure kettles.

The state experimental stations or the U. S. Department of Agriculture will furnish full information regarding the canning of any special crops, on request.

The demand for the so-called specialties — spinach, string beans, beets, sauerkraut, also rhubarb and apples in gallon cans for pies — is rapidly increasing and are articles which the home canner can try to advantage. It is not necessary that a person own a canner of great capacity or that he run it all through the season to have it show a profit. A home canner, even though it may stand absolutely idle during the entire season, many times will show a

handsome return from the fact that the owner knows that there will be no such thing as an unsold surplus while he owns a cannery. When the time comes that every fruit and vegetable farm has a cannery attached — and it is sure to come as soon as the growers begin to study economics — then will come the day when everyone will realize that there is no such thing as an over-supply of any article of food. Overproduction and surplus supply have been bugbears to us simply because we have never thoroughly studied out the best methods of distribution. We apparently have considered it absolutely necessary to rush our crops upon the market as soon as they were ripe, surfeiting the consumer with our abundance, so that he, many times, was sick of the sight of our goods; and then for the rest of the year we have let him go hungry for the same goods because we had not the products to supply him.

With the possession of a home canner these conditions are changed. If, when the fruits or vegetables are ready for market, the consumer is ready to use them, well and good; the grower can supply his needs. If the consumer for any reason does not wish the fresh articles, or the supply happens to be too abundant, well again; for the grower can keep at home the portion that is not needed, place it in the cans, and later in the season when the consumer calls for the various articles, the farmer has the food for him. No overproduction at any time, for improvement has taken place in the method of distribution.

WHY ORGANIZE A CANNING CLUB?

E. H. Forristall, Cortland, N. Y.

Farm Bureau Manager, Cortland, N. Y.

The canning club movement had its inception with Mr. O. H. Benson, Washington, D. C., who is in charge of boys and girls' club work, and has afforded educators of all lines of work the best opportunity to successfully meet the needs of the day with an education back to the soil and into the home.

The formation of the club should be in the school, but fortunately it may be adapted to community interests, husbanded by the church, local grange, or by a few interested people who are public spirited enough to secure the advice and help on organizing a club, so gladly given by the State College or the Department of Agriculture, Washington, D. C., and which means so much to those enrolled. The movement should not, under any circumstances, be undertaken unless some leadership is assured whereby the plans submitted can be carried out.

Organization of the girls of twelve years or older under a local leader should be perfected in the winter months, and each member supplied with literature on the subject. Headquarters should be centrally located and be supplied with a stove, fuel, cold water and a canning outfit. The project will best succeed when the girls are encouraged and allowed to rent a small piece of land at home on which to start their garden.

The first year it is best that everyone grow tomatoes because they afford so many practical lessons, such as starting the plants, fertilizing the soil, transplanting from boxes or cold frames to the garden, the cultivation and training of the plants, spraying for plant diseases, marketing the fresh product (always to be encouraged when price warrants), and the canning of all surplus in glass or tin. Members should keep careful accounts of all expenses and

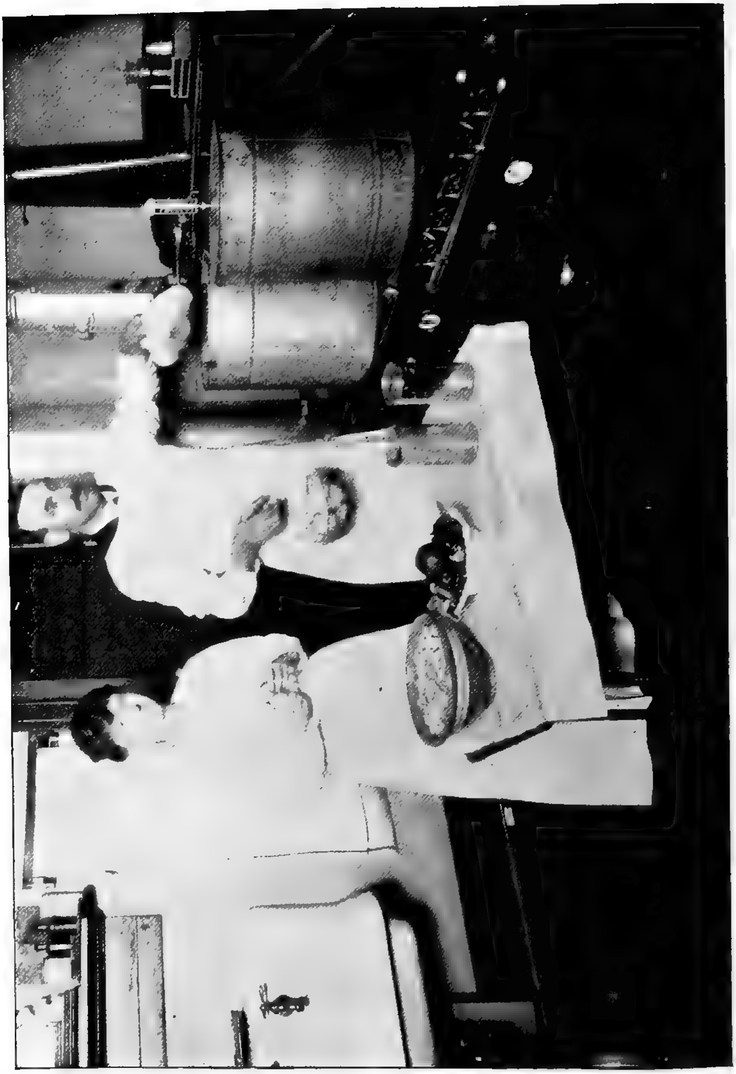


FIG. 361.—DEMONSTRATING THE CANNING OF APPLES. WHOLE APPLES READY FOR BLANCHING. SLICED APPLES TO BE CANNED FOR PIES

receipts, and report at the end of the season's work to the local leader.

Such a project vitalizes school work, makes it easy for the school teacher to reach the home, bridging that awful gap between the school work and the parents. It trains the girls to work together, to follow plans laid out by leaders, employing new and tried out methods which always find their way into the home.

Our girls, especially, should be interested in canning club work, and if they become members of the club that is being instructed by one who is appointed for that work, they are receiving help that their mothers are often unable to give them because most of the canning has to be done at the busiest time of the year. Then too, the girls are learning the shortest and best methods of canning which saves labor and time, and the products canned by this approved method are superior to those put up by the old methods.

Home canning takes care of surplus meats, products of the garden and fruits of the orchard. The windfall apple that heretofore has never been utilized, can be turned into a canned product and used in many different ways.

Vegetables and fruits that are very plentiful cannot possibly be utilized in their season, and will go to waste if they are not canned.

A splendid method of cooperation is to organize boys and girls into market garden clubs. Their members grow and sell their vegetables to the members of the canning clubs who have no time to care for a garden and are glad to be supplied with products fresh from the garden, instead of those brought into town by rail or over a long, dusty and sunny road and have lost much of their freshness. This procedure is of mutual benefit to both the garden and canning clubs.

Some very good canning outfits are manufactured which clubs are using with marked success. However, such an outfit is not necessary for home canning. A washboiler with a tight cover is very satisfactory. If the cover is not quite tight, a piece of cheesecloth should be put over the top of the boiler and weighted at the corners. Then, when the cover is put in place, very little steam will escape. A wooden rack should be made and placed in the bottom of the boiler so that the cans will not come in direct contact with the heat.

FIG. 362.— THE FINISHED PRODUCT

The business training that results from work in the canning club is worthy of our consideration. Members should keep a record of all expenses such as cost of product (if purchased), materials such as sugar or salt, jars, rubbers, labels, etc. Every hour spent in canning should be recorded and be included in the same expense account. Receipts will include fresh vegetables or fruits sold, and canned products sold. If accurate records are kept, each member will know the value of her canned product; and by comparing the cost per can with what she would have to pay at the store for the same thing, she could determine how much she had saved by canning at home.

FIG. 363.— A CLUB MEMBER'S FRUIT CLOSET, REPRESENTING ONLY ONE-HALF OF THE SEASON'S WORK. PHOTO TAKEN JANUARY 9, 1915. NOTE THE PICKLES, MEAT, VEGETABLES, FRUITS, JELLIES, CONSERVES AND GRAPE JUICE

The keeping of these accounts results in the houswife giving more careful attention to the elimination of many unnecessary expenses and seeking to be more economical. The simple accounts such as they have been keeping in the canning club work illustrates to them their value, and arouse a determination to keep household accounts, something to which heretofore they have given

little or no attention. This new resolution backed up by actual experience is not so easily broken or forgotten as the resolution adopted by so many women when they determine to keep a record of expenditures for the coming year, only to give it up after two or three entries have been made.

The item of time spent in performing household duties should never be lost sight of and is a valuable part of household accounts. When a woman is hired by the housewife to do any particular work, account of the time spent is considered and she is paid for what she has done. How seldom it happens and yet how important that the hours spent every day by a woman in her home should be valued. If they were, more thought would be given to the

FIG. 364.— CANNING CLUB EXHIBITS IN THE FARM BUREAU TENT. CORTLAND COUNTY FAIR

saving of steps by the proper arrangement of stove, cupboards, work table and sink in the kitchen so that the fewest possible steps would be needed to accomplish the greatest amount of work.

We should not forget the social benefits of the club. The opportunity afforded of merely coming in personal contact with the older and trained mind of the instructor has a great influence on the younger person whose mind is plastic, and when her interest

is aroused in any particular work she is eager to accomplish and perform her everyday duty in that same pleasing, easy and forceful manner.

When the women come together in their meetings, valuable ideas are exchanged. They enjoy the sociability of the occasion, and oftentimes members who have had splendid thoughts on the home life had never before shared them because no opportunity has presented itself. Many a woman, as she goes about her home performing the tasks of the day, has ideas suggested to her that often would never find expression except through the medium of the club. There is rest and recreation in leaving the cares of the home for an afternoon and mingling with friends. The housewife returns to her home refreshed and with many helpful suggestions, and the work of the coming day is anticipated with pleasure.

The farm bureau in cooperation with the domestic science department of the New York State College, organized eleven canning clubs in Cortland county in 1914, with a membership of 284, which comprised both women and girls. In two clubs, sales agents were appointed to take care of those customers who wished to purchase the superior product put up by club members. The sales of one member, made to some of the best families of the city, have already amounted to over $40, establishing a cooperation between the women of the country and the city.

Meetings in each club were held regularly every two weeks. Miss Bertha E. Titsworth of the State College was the instructor. The meetings were held in a grange hall or in the home of some member. As products appeared in season, Miss Titsworth demonstrated the canning of them, at which time the members assisted. Questions were asked and answered, and the time intervening from one meeting to the next was spent by the club members in their homes canning their products according to the methods demonstrated.

A report of every club meeting was made to the farm bureau by Miss Titsworth. It included the name and place of club, membership, number and names of members present, number of visitors present, what products were canned for demonstration, and some of the questions asked by the members.

The canning of meats is now being done very successfully by the club members. We were informed only yesterday that they were filling the cans as fast as they were emptied of fruits and vegetables, with meats to be used next summer; thus making use of the glass jar the entire year.

VEGETABLE FORCING IN NEW YORK STATE

H. W. Schneck

Instructor, Department of Vegetable Gardening, Cornell University, Ithaca, N. Y.

SUGGESTIONS FOR IMPROVEMENT

No other branch of agriculture has made such rapid forward strides during the past decade as has the vegetable forcing industry. Twenty years ago one could find only small vegetable houses, and very few of those, near our larger cities; whereas today there are many acres of land farmed under glass. Still there is room for much more development, since the demand for greenhouse products far exceeds the supply during most seasons.

Inquiry is often made regarding danger of over supply of greenhouse products. This is a pertinent question, especially at such times as during the fall of 1912 and the fall of 1914, when lettuce sold for much less than it cost to produce it at the large forcing centers. In these two apparently dull seasons, many small towns throughout the country were not properly supplied with greenhouse products. During the past fall when lettuce sold for two and one-half cents a pound at Cleveland, it was bringing sixty cents a dozen bunches at many smaller towns. These facts will show at a glance that it is not a question of over-production, but rather a question of proper distribution of the products.

Another factor to consider with respect to avoiding the danger of gluts on our large markets, is diversification of crops. At the present time there are but three or four crops to which forcing men devote any very considerable attention. These crops, in order of their importance are: lettuce, cucumber, tomato, and radish. Lettuce is grown by nearly all forcing men in fall and winter, when there is least demand for it. As a result, lettuce often brings a low price at this time of the year, especially if the

preceding outdoor growing season was a long one. Many other crops could be grown in fall in a small way, which would pay much better returns than does lettuce. Some of these crops are: rhubarb, witloof chicory, cauliflower, onions, beets and Swiss chard. By growing a greater diversity of crops, a double gain is secured. First, a direct gain from the sale of these additional crops; and secondly, an indirect gain, by lessening the production of lettuce in fall, and so increasing its value.

There is but one factor which seriously hampers the vegetable forcing industry, and that is "hard times." The industrial classes suffer most during periods of financial depression, and it is this class to which the greenhouse man looks for an outlet of his produce.

In addition to making use of the greenhouse for growing vegetable plants to maturity, it can be used in spring of the year for growing early plants to be set out in the field. This will require the greenhouse space from about the first of February to the first part of May. Early vegetable plants may be grown not only for the owner's use, but also for sale. This is a very profitable business near many towns. After the greenhouse has served its purpose for plant growing, cucumbers can be set out the beginning of May and yield a handsome return throughout June, July and August.

MOST IMPORTANT SECTIONS

The largest vegetable forcing section of New York State is located near Rochester, Monroe county, and is known as the Irondequoit section. This is one of the seven large forcing sections of the United States. A careful estimate of the area under glass at this place would place it at about twenty-five or thirty acres. There are no very large greenhouses, but many gardeners have small ranges. The largest range consists of about eight acres. This is of the ridge and furrow type construction. Most of the houses in the Irondequoit section are of the even span, separate type. They are of the very best and most expensive construction. The 40 x 180 foot all iron house seems to be the popular type, and several of these houses have been erected during the past year.

The Irondequoit section not only supplies Rochester with win-

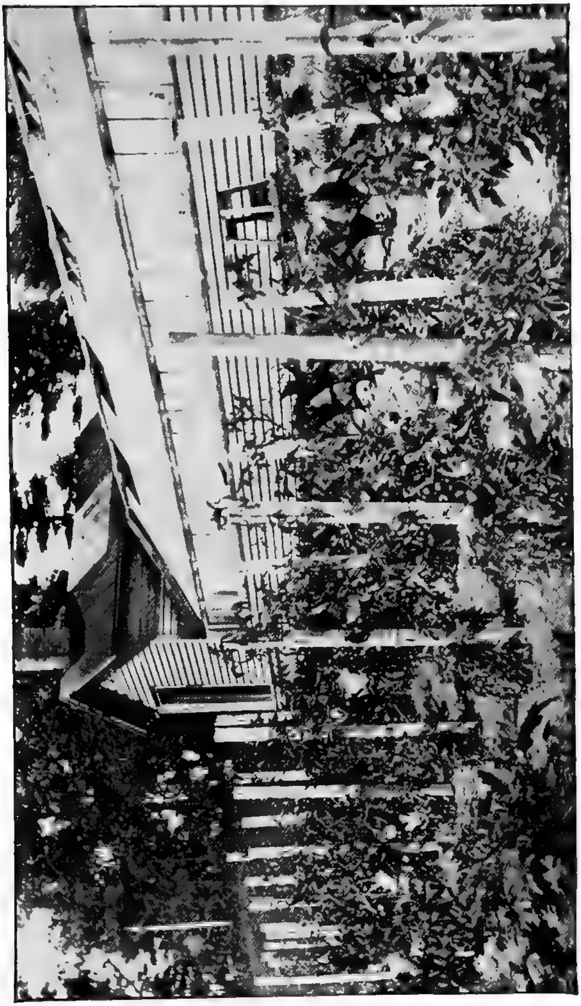


FIG. 365.— THE TYPE OF GREENHOUSE WITH WHICH GARDENERS BEGIN VEGETABLE FORCING

ter vegetables but ships a great deal to Buffalo and the smaller towns of the state, as well as to the mining towns of northern Pennsylvania. Many small towns in New York State offer splendid inducements in the vegetable forcing business. A few towns, such as Binghamton, Elmira, Troy and Ithaca, have one or more small vegetable ranges, and the men conducting these places are doing a splendid business. There are many other towns in the state which at present are under-supplied and which offer just as good opportunities as the towns mentioned.

FIG. 366.— A ONE-ACRE RANGE AT IRONDEQUOIT

SOIL

The soil in the Irondequoit section is one ideally suited for vegetable forcing. It is a light sandy loam, which will take plant food and water readily, but the surface of which will dry off quickly. It is very easy to work and does not bake or puddle.

FERTILITY

Growers maintain the fertility of their soil by trenching well-rotted manure several times a year. This well-rotted manure not

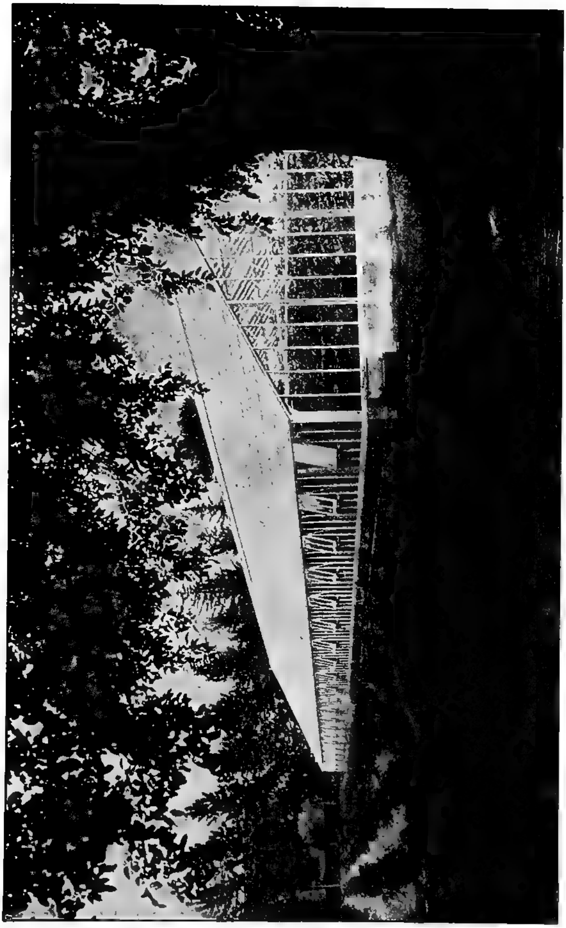


FIG. 367.— A MODERN VEGETABLE HOUSE

only adds plant food to the soil in a readily available form but also improves its physical condition.

Not many growers of greenhouse crops use commercial fertilizers, most of them holding the opinion that by trenching manure enough plant food is added to the soil to maintain fertility. Probably commercial fertilizers would prove beneficial, especially for certain crops. Some form of phosphorus would be very beneficial to cucumbers and would hasten the maturity of the fruit. Potash should be applied to tomatoes, since it is known that the tomato plant demands large amounts of potash, and a sandy soil usually is low in this element of plant food.

LIME

Greenhouse men lime their soils every year, applying at the rate of five to eight pounds of air-slaked lime to every one hundred square feet of area. Lime improves the physical condition of soil and sweetens it.

GENERAL CROPPING PLAN

During the past few years, many of the Irondequoit growers have attempted to raise cucumbers and tomatoes as well as lettuce, radishes and parsley, in their greenhouses in fall. In many cases these growers have failed with their fall crops of cucumbers and tomatoes, chiefly because the houses were neglected in fall, most of the growers devoting their time to celery harvesting instead of remaining in the greenhouses. Cucumbers and tomatoes need constant care and attention. Especially is this true in the fall of the year. One grower near Elmira, N. Y., has been very successful with fall tomatoes, and the secret of his success is constant and unceasing care and attention to the plants. It is practically an impossibility to raise cucumbers successfully in the greenhouses of New York State in the fall of the year on account of the dark, gloomy weather prevailing in at least most sections of the state at this time. Under proper care and management, tomatoes can be successfully grown in this state in fall, but they will need a great deal more attention than in spring, and one cannot expect nearly so large a crop, but prices are usually better in fall than in spring.

The one important factor to be kept in mind with fall tomatoes is to get an early start and have all the fruit set before the period of dark, gloomy weather. This will necessitate sowing the seed the latter part of June in order to have the plants ready for the beds the latter part of August. These plants should give a good crop of mature fruit for the Thanksgiving and Christmas markets.

The usual cropping plan followed by most growers in New York State is lettuce and radishes in fall and winter. In spring the houses are given over to tomatoes and cucumbers, most men sacrificing an extra crop of lettuce in spring for an early crop of cucumbers or tomatoes.

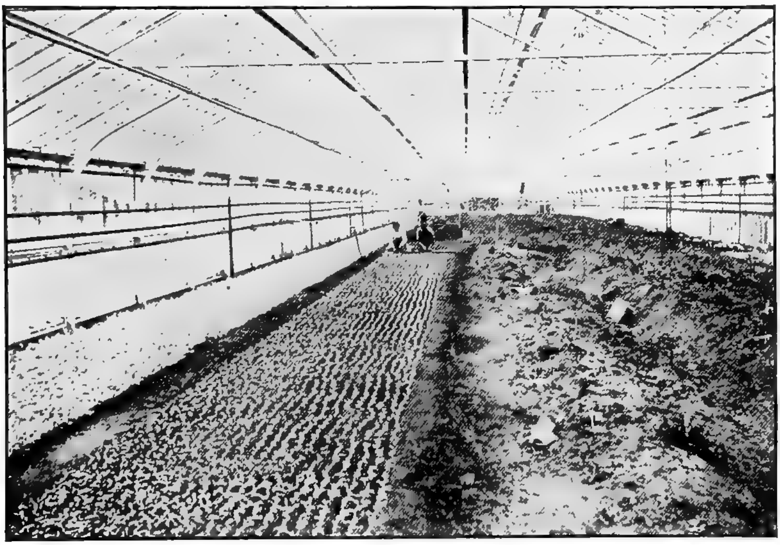


FIG. 368.—PLANTING LETTUCE IN A LARGE COMMERCIAL HOUSE

LETTUCE

There are two types of lettuce grown at Irondequoit, the leaf or bunching type and the Grand Rapids variety of this type. A loose head type is grown for local market, the variety being known as May King or Improved Keene. The Grand Rapids lettuce is shipped to smaller towns of the state and to the mining districts in northern Pennsylvania. The growers in smaller towns grow the Grand Rapids variety almost entirely.

The seed is sown in drills in the ground beds at one end of the house. In from two to three weeks the seedlings are pricked out and placed in another portion of the bed, spaced 2 x 2 inches. After growing here for about three or four weeks, they are set in the permanent bed. The spacing in the permanent bed varies with different growers, some spacing 7 x 7 inches, others 6 x 7 inches, and still others 6 x 6 inches. The 7 x 7 inches spacing is used most extensively with the May King variety.

In early fall and spring it takes about six weeks to mature a crop of lettuce after it is placed in the bed. In late fall and winter it requires eight or nine weeks.

The growers in New York State sell nearly all their lettuce by the dozen heads, not by weight. Lettuce sold locally at Rochester brings twenty cents a dozen heads in fall, until in December, when it brings twenty-five cents a dozen for the remainder of the season. In smaller towns in the state the growers receive from twenty to thirty-five cents a dozen heads.

No standard type of package is used to market lettuce, as most of it is sold locally. For shipping, the growers use various types of cheaply constructed packages, some merely using old orange crates, which are purchased very cheaply.

CUCUMBERS

At Rochester the Abundance variety of cucumber is grown almost exclusively. It is a cross between the English type and the American type, and the growers have selected for a cucumber twelve inches long and about two and a half inches in diameter. This cross cucumber is also grown in smaller towns in the state, but the White Spine is grown to a greater extent away from Rochester.

The seed is sown in flats, in drills about one and a half inches apart and about one inch between seed in the drill. As soon as the cotyledons have developed, the seedlings are pricked out into three-inch clay pots. From these they go to four- or five-inch pots, depending upon the length of time they are to be held before going to the permanent bed. It is always well to imbed the clay pots in soil so as to prevent drying out. The young plants are grown at a temperature of 70 degrees. Great care is exercised

so as to avoid checking the plants at any time, since the cucumber plant never recovers from a check.

Cucumbers are grown chiefly as a spring crop in New York State. The Rochester growers sow the seed for their first crop on the first of January. These plants go to the beds in early March and start bearing mature fruit the early part of April.

In New York State all growers with large houses train their cucumbers on the overhead trellis system. It has been found that with the Abundance variety of cucumber, a much higher yield can be secured by this method of training than with the upright system, although the plants do not come into bearing as early.

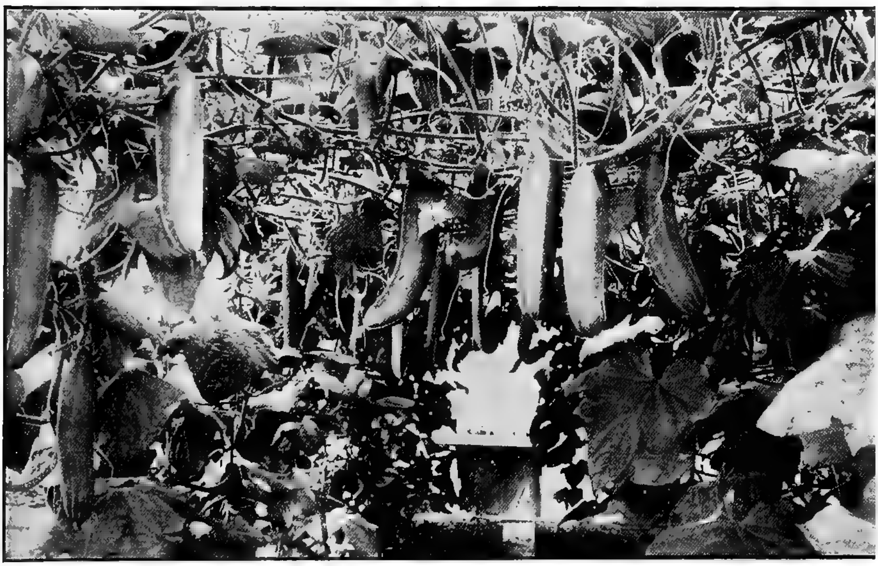


FIG. 369.—CUCUMBERS TRAINED ON AN OVERHEAD TRELLIS.

With this system, each plant is given at least sixteen square feet. The plants are taken to the overhead trellis by means of a cord looped around the base of the plant, and tied to the top wire. All the side-shoots or laterals are removed as soon as they develop. As a rule, all the female flowers are also removed. As the plant nears the overhead trellis, three or four laterals are left to develop and these form the starting point for other laterals and sub-laterals which will finally cover the trellis. As the leaves on the main stem or on the trellis turn yellow, they are removed. The

new shoots developing on the wires are pinched off just beyond the second node.

During the past season two troubles have materially lowered the yield of greenhouse cucumbers in New York State. Namatodes or eel-worms were very severe in many houses. The growers have not practiced systematic sterilization, but nearly all of them steam sterilized their soils in the fall. The other trouble which has caused a great deal of loss is a new disease known as white pickle. This new trouble has shown up especially in the Irondequoit district. The effects are first found upon the fruit, it turning a lighter green color. Often the fruit becomes blotched in appearance, which blotches sometimes show as warts. Both small and large fruits are attacked. Later the leaves turn yellow and die. This disease seems to be more prevalent with fall than with spring cucumbers. As yet, nothing is known as to the cause of this trouble, although it is thought to be contagious. Therefore, the plants should be removed from the house as soon as they become affected.

Red spider, white fly and aphides have been very severe in many cucumber houses. For red spiders the growers syringe the undersides of the leaves with a strong current of cold water. For white fly they fumigate with hydrocyanic gas at the rate of one ounce potassium cyanide to four thousand cubic feet, and nicoticide fumes efficiently control the aphis or green fly.

The fruit is picked regularly every morning and marketed locally. The earliest cucumbers in spring bring two dollars a dozen. The price gradually goes down to a dollar or ninety cents per dozen in May and June.

Rochester growers figure on a yield of thirty-seven dozen cucumbers per hundred square feet of area as a good average. Many of the men secure better yields than this.

TOMATOES

New York State markets demand a red tomato. The Bonny Best and the Peerless or Lord Roberts are the two varieties most extensively grown. Some men have much better success with one than with the other. The chief objection to the Bonny Best, brought up by men who are successful with the Peerless, is that

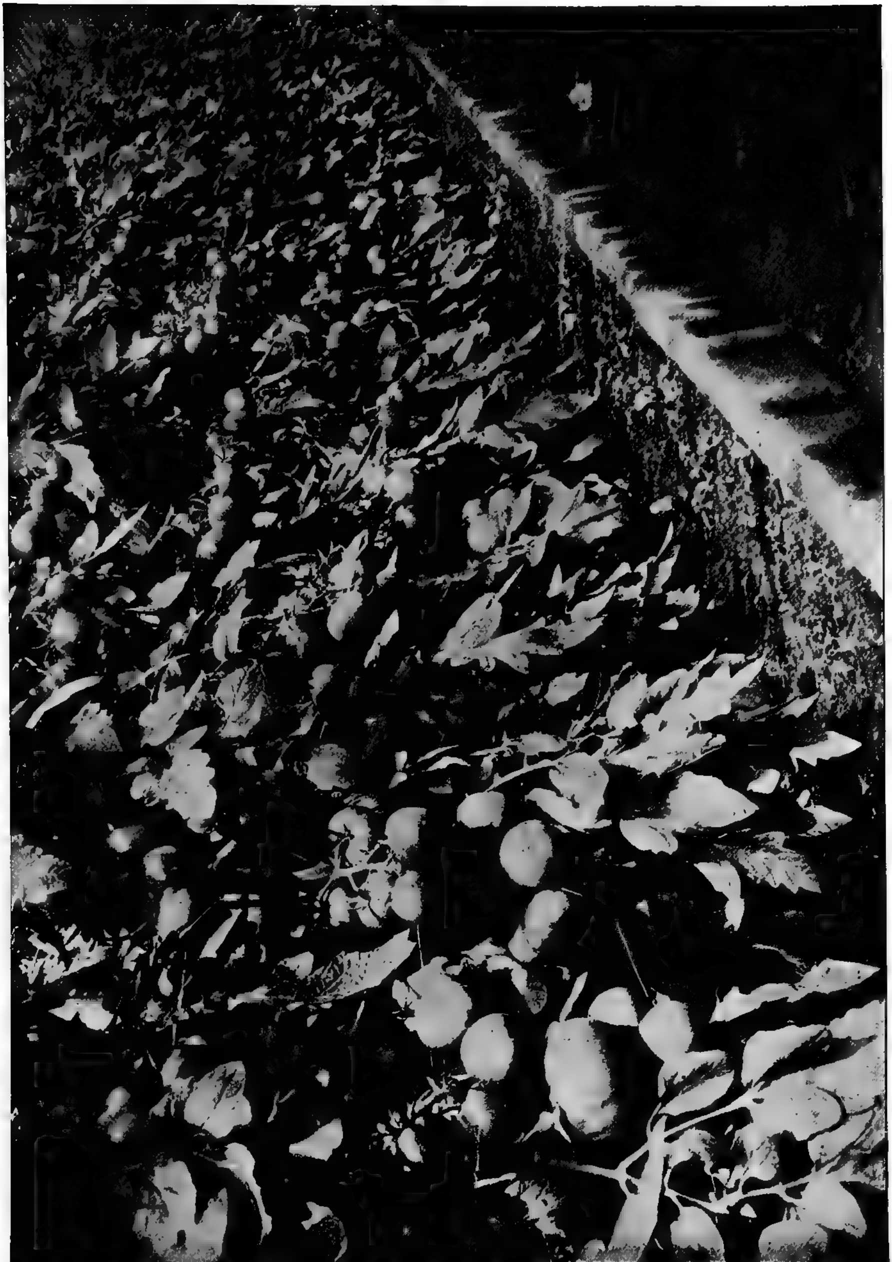


FIG. 370.— A GREENHOUSE CROP OF TOMATOES AT IRONDEQUOIT, N. Y.

it does not yield as heavily. The chief objection to the Peerless is that the fruit tends to be too small. With an English type of tomato like the Peerless, one must feed the plant heavily in order to get good-sized fruit, and the fruit clusters must be thinned to six or seven fruits.

The tomato plants are started in practically the same way as the cucumber plants, with the exception that the seed is sown more thickly in the drill. Also, the seedlings are usually pricked out two by two inches in other plats before going to three- or four-inch clay pots. It requires from ten to twelve weeks from time of sowing seed to time for the plants to be placed in the permanent bed, and about two months more for the plant to bear mature fruit.

The spacing distances vary greatly, most men allowing about four or five square feet to a plant. The single stem system of training is practiced almost entirely, all side shoots or laterals being pinched off as soon as they appear.

The disease which is giving most trouble with tomatoes is the leaf mold or leaf blight, caused by a fungus, *Cladosporium fulvum.* This fungus works on the lower leaves of the plants first, producing dirty, grayish-brown, moldy or velvety spots on the undersides. Yellow spots appear on the upper sides of the leaves. Later, the entire leaf turns black, shrivels and dies. If this disease does not appear until the crop is half gathered, it will do little harm. If it occurs early, the lower foliage should be sprayed with bordeaux mixture 4-4-50. A few men in the state were able to check this disease in their tomato houses this past fall by spraying early enough.

The fruit is harvested when it matures and most of it is marketed locally, although during the fall, growers who are successful ship to New York city and Philadelphia.

The yields and returns vary greatly with different growers. One grower using the Peerless variety secures an average yield in spring of ten pounds per plant, or a little over five tons to a house 180 by 30 feet. This is exceptionally high. Most growers do not average more than five or six pounds of fruit per plant.

In spring tomatoes usually sell for from ten to fifteen cents a pound, sometimes going as high as twenty cents in very early spring. In late fall they command higher prices.

PARSLEY

Most growers set out a small block of parsley in fall in the darkest portion of the house. Parsley will do well in such locations, and there seems to be a good demand for it on most New York markets.

The plants are grown in the open all summer and in fall the roots are brought to the greenhouse, setting them six by six inches in the beds. They require very little care, and growers get three or four cuttings from a bed during the winter. Parsley sells for from eight to fifteen cents a dozen bunches, usually about four sprigs to a bunch.

RADISHES

Radishes are grown extensively by some growers, especially by the Rochester men, in fall. The Scarlet Globe variety is used. The seed is sown in drills two or three inches apart, and the seedlings are thinned early to stand two inches apart in the row. The great trouble with over 50 per cent. of growers is that they do not thin their radishes enough, and as a result the plants produce all tops and very small bottoms.

The radishes are bunched, placing six or eight to a bunch, depending upon the size of the roots and the market demand. They bring from twenty to thirty-five cents a dozen bunches throughout the winter months.

WATER CRESS AND ONIONS

Two other crops grown in a very small way at Rochester in fall are water cress and onions. The seed of water cress is usually sown broadcast in September. Some growers transplant the cress in three or four weeks, setting it six by six inches. It is claimed that transplanting gives better, stockier plants. Cress is marketed in bunches about one and a half inches in diameter, and sells for thirty to forty cents a dozen bunches. It requires little care, and is a very profitable crop, provided a good market is available.

The Egyptian or perennial onion is used for forcing. After the sets have been removed from the onion stalks in the field in early fall, the so-called leaves are cut off close to the ground. New shoots are sent up, and the old bulb splits, forming perhaps six or

seven new bulbs. Just before frost, these bulbs are removed to pits, and are frozen. When ready to use, they are thawed out gradually, and then set close together in out-of- the-way places in the greenhouses. Nice green onions the size of a lead pencil will be produced in from one to three weeks, depending upon the amount of sunshine. Four or five onions are placed in a bunch, and they bring from twenty to twenty-five cents a dozen bunches. Many growers in this way secure good returns from dark corners which would otherwise be waste space.

ESSENTIALS TO SUCCESS

Success in vegetable forcing depends upon three factors. First, a love of the work. There is no field of plant industry in which one is brought into closer contact with plants. If a person does not care to work with plants and be with them constantly, he had better not undertake vegetable forcing. Second, the selection of a proper location, with respect to water supply, fuel supply, market and transportation facilities. The third factor upon which success depends is attention to minute details. In common with floriculture, vegetable forcing is the most intensive of agricultural pursuits. All conditions of production are under the operator's direct control. If a grower allows one condition to vary slightly, he will usually allow others to vary. The sum total of these apparently insignificant variations may easily mean failure.

To a man who is imbued with a deep love for growing plants, who has selected a suitable location, and who is willing to make sacrifices in order to have all conditions ideal for the growth of the plants, vegetable forcing offers rich rewards.

THE FARM GARDEN

William Hotaling, Kinderhook, N. Y.

Farmers' Institute Lecturer

The farm garden is often one in name only. If properly managed it should be one of the most profitable parts of every farm, and the factors that mean success are: suitable soil, convenient location, thorough preparation, proper varieties, good seed, economy of labor, doing the work at the right time and in the right way, and having something to use as much of the year as possible.

The laying out of the garden is important. The longer and straighter the rows the greater will be the economy of labor, and in practically every part of the state it will pay to plant far enough apart so the ground may be worked with a horse.

Fig. 371.—String Beans and Carrots From the Home Garden

A LIST OF DESIRABLE VARIETIES

Spinach would naturally be the first vegetable to use in spring, and wherever the climate will allow should be sown in August or September (depending upon latitude), in order that it may

get two or three inches high by winter, then covered with coarse straw or litter for protection. This cover is removed in the spring when danger of frost is passed, and the spinach is quickly ready for use. For later use sow as soon as the ground can be worked in spring and about every six weeks for succession.

The onion may be treated the same as spinach, using either the sets in late fall or the seeds sown in time to grow them to about set size. Either will give much earlier onions for use than we can get if the ground is not prepared until spring and setting done then. The sets are more expensive but much less work, and are therefore to be recommended.

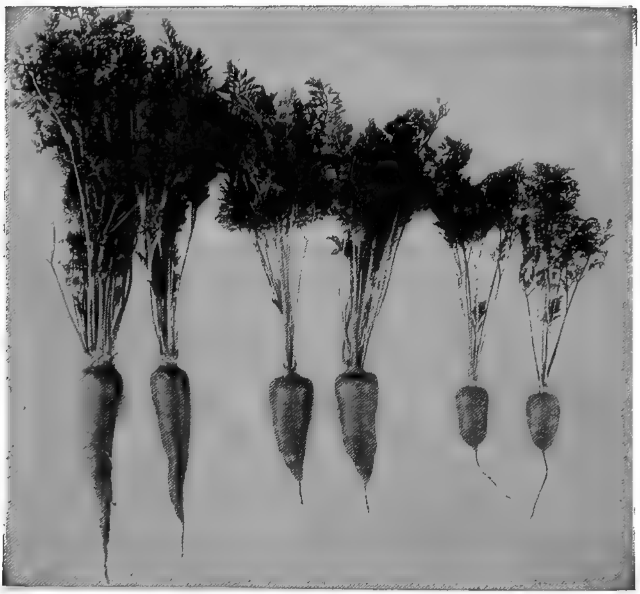


FIG. 372.— CARROTS OF THREE TYPES. THE SHORT TYPE IS USUALLY GROWN FOR EARLY USE, AND THE LARGER TYPES FOR WINTER

Seed onions and all root crops, especially for early use, do better as a rule if put in reasonably early in spring.

Parsnips and parsley germinate very slowly and should not be covered deeply, especially if the ground is dry. In that case place a board or a damp sack over the rows for a few days after planting.

Parsnips are best stored for winter by piling like stove wood

on a board, sprinkling on enough earth to fill openings, then setting where they will stay frozen. To draw out the frost, when ready to use, break off and put in cold water. They may be left in the ground until spring, if desired.

Carrots too, while they germinate more quickly, are rather delicate when first up, yet it is important that all should be worked quickly to keep down weed growth and conserve moisture.

A few radish seeds mixed with all these, and any others that may be delicate when first up or that come up slowly, are a help. Then mark the row quickly and plainly so that work may be started at once, as well as breaking the soil so that the less vigorous seeds may more readily push through.

Beets may be sown as soon as the ground is fit in the spring. For winter use, either for canning or storing, sow about July first.

With all the root crops and onions it seems unnecessary to say anything about varieties, there being little differences except size and shape. All, however, are considered laborious to grow; therefore care is important. Cultivation should be begun as soon as possible and the rows kept narrow — the narrower the better. When plants are two or three inches high, pass through with a hoe, cutting out the row except where the plants are to stand, leaving in each place a clump about one to two inches long. Then one can quickly thin by hand to the desired stand. Generally they should be gone over twice, leaving at first about double what is eventually needed to insure a full stand. This makes the ground clean and easy to work.

Lettuce is another vegetable one should have, and there are many good varieties; generally, however, all are of two rather distinct types — the loose open head or the compact cabbage head. It is natural for all to head in one of these two ways if properly handled. Lettuce should be sown rather thickly in rows, keeping them always thinned so that they do not touch each other; or the seed can be sown in the seed bed and transplanted to about four inches apart. Lettuce is one of the things that must grow quickly to be good. The soil should be enriched with well-rotted stable manure or some other form of quickly available nitrogen. It is also a plant that, while it naturally roots deeply, can not do so in hard soil. Therefore, the ground should be prepared well and deeply for best results.

If an open head variety is desired, Simpson Black-Seeded is a good one. If the true head is preferred, Hanson's head lettuce will generally be satisfactory.

Peas are almost endless in variety. They are distinctly a cold weather plant, therefore anything we can do to keep the root system cool and moist is desirable. This can generally best be done by planting in rather deep furrows, covering lightly at first and drawing in earth as the crop is worked, until the surface is level. Peas do best when fertilized more heavily with phosphate and potash, rather than with nitrogen. The best single fertilizer I have ever used in gardens is wood ashes mixed with the soil and spread thickly in the rows.

Smooth peas are hardiest and should be planted first. Alaska, Premium Gem and Dwarf Champion will generally be satisfactory. Nott's Excelsior and Telephone are also excellent. None of these require bushing and can be obtained everywhere. Planted at the same time they give good succession. The Dwarf Champion planted as soon as last planting of the above is two or three inches high, will continue the succession as long as practical. Planting at alternating distances of one foot and three feet so that two rows may be pushed together when large enough, helps them to stand up.

For early tomatoes, and in places where the season is short, Earliana should be used. For later and longer seasons, Stone is a good variety.

Tomatoes are more often unsatisfactory because of shallow planting than for any other reason; no matter what their size they should be set deeply. Their ability to send out roots along the entire stem quickly gives them a strong root system.

Where plants can not be bought they can generally be raised in pots in the house for early planting and should be as large as possible and have some small fruits by the time they are transplanted in the garden. Set not less than four feet distant in the rows, rows five feet apart. They should be set so that not more than four or five inches extend above the surface.

Another very injurious thing to the tomato plant is cold winds. This may largely be overcome by setting plants east and west, and nailing together two ten-inch boards like a common eave

trough, laying this in the north side of the row, one board lying flat, the other standing upright. A few stones may be placed so as to keep the boards from blowing over on the plants. This allows the sun to strike them all day and not the wind. At night, turned upside down over the row, they are much better than boxes and cans. If the green tomatoes are picked off the last thing before frost, wrapped in paper and stored in baskets or flat boxes (not too many together) in a cool, dry place, most of them ripen as good as southern stock seen in the stores.

Muskmelons too are not grown as generally as they should be. Small early varieties like the Jenny Lind may be grown successfully quite far north.

In the growing of any of the melons and cucumbers a little scheme used by and learned from a southern grower for early

FIG. 373.— HARVESTING SNAP BEANS

use has been most valuable.* Throw up a ridge about a foot high running east and west, then at a distance of from three to four feet make openings on the south side from the edge. This will be from very shallow at the edge to quite deep at the back of opening. Then take one-half of the seed and soak in tepid water for twenty-four hours, or long enough to start the sprout; mix with dry seed and plant from the edge of opening into back of same and cover. One will then have sprouted seed and that

* See article on "Melons" by Charles D. Barton.

which is not, and covered all the way from one-quarter of an inch up. The result is, some will be up under good conditions in forty-eight hours and others will continue to come up for three weeks. After a couple are up the others should be kept pulled out. The advantage of this plan is: if the first plants are lost by frost there will probably be others to take their place the next day. All will appreciate the difference in temperature on the protected south side of the ridge.

For pickling, plant cucumbers July 1.

Lima beans may be grown successfully in most parts of the state. The small bush lima is very prolific and about as hardy as any of our bush beans, with good length of season. There is no longer need for using the pole varieties.

With the large limas we should bear in mind that all must turn upon edge before they can come up. Many times, because of their size or soil condition, they are unable to do so; as a result of which they necessarily rot. Then we think the seed has not been good. The easiest way to overcome this is to stick with the eye down when planting. Both Henderson and Burpee are good and may be had everywhere.

Among the varieties of other beans the Golden Wax and Early Valentine are good bush varieties and Lazy Wife is a good pole variety.

It would hardly do to say anything about a garden without including corn. The Golden Bantam, Champion, Country Gentleman and Stowells' Evergreen will give a nice succession of true sweet corn.

While celery does not need to be set early, the plant must be started early. The seed bed, like all other seed beds, should not be too rich or plants are liable to damp off if weather is dry. The bed must be watered and partially shaded to prevent baking. A slat cover where shade and sun alternates is best.

Golden Self Blanching and White Plume are standard varieties.

The plant food must be where the roots can get it. Therefore, if we trench (which for a garden is best) we must put plant food under the plants. Boards, building paper or roofing paper are good for blanching and are cheaper and easier than to use earth. If earth is used, plants should be carefully handled to avoid

getting more earth than is necessary inside; and if it is necessary to water after starting it to blanch or after it is stored, care should be taken to get water only on the roots, as water inside the head will promote decay. To water, use a piece of pipe or hose and funnel to avoid getting water on tops. A wet root system and a dry top is ideal.

To store celery for winter put earth only on roots.

Cauliflower requires the same treatment as cabbage, and for best results the crop must be put in about July 1 so as to mature after hot weather. The leaves must be either broken over or tied together to protect heads after heading. Early Snowball is a good early variety; Large Algiers a good late one.

FIG. 374.— CELERY BLANCHED BY MEANS OF BOARDS, FLUSHING, L. I.

Egg plant is very tender and requires about the same treatment as the tomato. At the start it must be carefully watched to prevent injury from potato beetles. Black Beauty is a good variety.

Okra is a southern vegetable but excellent to use in connection with tomatoes, or in soup. It should not be planted until the ground is warm, in rows 2½ feet apart and 1½ feet apart in the row. White Velvet is a good variety. Use pods when young and tender; cut up as string beans.

Peppers will never do well if put out before weather and ground are warm. They grow rapidly and are ready to use in a

comparatively short time after planting, if warm conditions prevail, but they require lots of heat to develop quickly. Chinese Giant is the best variety.

Salsify, or Vegetable Oyster, is used as a substitute for oysters, tastes as good and is more nutritious. Sow early in spring, thin to 3 inches in the row, dig in the fall and store as beets; or it may be left in the ground all winter and used in the spring. Mammoth Sandwich Island is the best variety.

Rhubarb, or pie plant, with asparagus, demands a permanent place in every garden, furnishing material for delicious pies or sauce long before berries or fruit are obtainable. It is very hardy and requires no winter protection, although vigor and earliness are enhanced by covering during the winter with coarse manure.

It may be grown from seed sown in early spring, as with onions. Later the plants should be thinned to six or eight inches in the row. The next spring the yearling roots should be set as early as possible, in rows four feet apart and an equal distance in the row, with the crown of the plants level or slightly below the surface of the ground. Or, roots may be purchased and a year's time saved.

Rhubarb is a rank feeder and the soil should be full of humus, supplemented annually by liberal dressings of manure. The more thorough the tillage, the more satisfactory will be the crop. No crops should be gathered until the third year after planting, in order that a strong root growth may be established. Only the larger stalks should be pulled, leaving the others to assist in maintaining the plant. Seeds should be removed promptly as they exhaust the plant.

After rhubarb has been out a long time the stalks are apt to be small. When this occurs the roots should be cut out and thrown away. They are not as desirable for starting a new plantation as young, vigorous plants.

If this cutting out is done in the late fall, and the roots taken out are allowed to freeze, and are then planted in boxes in the cellar, they will start to grow; and one may have the white tender stalks to use during the winter.

Turnips have value both for the table and for feeding stock. For summer use I would advise growing kohlrabi, which, strictly

speaking, is not a turnip. The seed can be sown in the hotbed, or, as soon as the ground is fit, in the open, in rows 14 inches apart and about 4 inches distant in the row. Transplant about the same time as early cabbage. They should be gathered before they are full size.

The common strap-leaf purple turnip can be sown between the rows at the last cultivation of corn or potatoes, and in a wet season will make a good crop either in the garden or field. They can be sown the last of July after the early peas have been gathered.

Rutabagas in New York State should be sown in late May or early June, in drills 18 inches apart in the garden and in the field far enough apart to work with a horse. After they are established they should be thinned to 8 or 10 inches in the row. Rutabagas grow best when the nights are cool.

I have left asparagus until last, not because I consider it of less importance, but because I want to take it up a little more fully. There is nothing I can think of as being a greater acquisition to the average garden than a good asparagus bed, and it takes but a comparatively small one to furnish an ample supply for the average family. One hundred plants set 18 inches apart in the row — and if more than one row, 4 feet apart — should be ample. The Palmetto is an excellent variety. If the bed is to be plowed over plants should be set 12 inches deep.

Again we must have plant food under the plants for best success. A trench eighteen or twenty inches wide with two or three inches of well-rotted manure well trodden down, and three inches of good soil on that, is ideal. Cover plants only two or three inches at time of setting and work earth in during the summer, having all level by fall. After that cut tops when killed by frost and burn, give light dressing of manure to work in in spring and keep free from weeds. The second year some may be cut and the third year a full crop. The bed will remain for many years. This is satisfactory garden treatment.

VALUABLE TOOLS

Where there are not too many stones, a plank drag is excellent, and, alternated with a spike-tooth harrow, will do away with much raking. When the ground is comparatively free from stone, the combined wheel hoe and seeder is a great labor saver. Where this is not practical the implement made by putting five small cultivator teeth on a handle like a hoe, and that are adjustable, is almost indispensable. By drawing it either each side or between the rows, much work can be done.

SOILS AND FERTILIZERS FOR VEGETABLES

J. F. Barker

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Soils to be well suited to the growing of vegetables should be light in texture, thoroughly underdrained, but well supplied with moisture. This usually means deep sandy loams, loams and muck soils. The physical properties of the soil and nearness to market are more important factors to be considered than natural fertility, for the latter can be supplied more easily than the first can be modified. The necessity for frequent stirring, ridging and even handling of the soil in vegetable growing constitutes in itself sufficient reason why soils of light texture should be selected. But where early and rapid growth and quick maturity are important considerations, it is only the light, sandy or muck soils that can be used. Such soils warm up much earlier in the spring, admit of more rapid decomposition of organic matter and formation of nitrates and more rapid movement of plant-food solutions in the soil. These crops, on such soils, can be planted earlier in the spring and brought to maturity in a shorter time than on heavier types of soil. However, almost any soil can be made to grow a good crop of vegetables, and for home use any type of soil available may be so employed. The sandy soils will not produce so large a crop as somewhat heavier soils under the same conditions, and so for late vegetables the loams or even silt loams are to be preferred.

FERTILIZERS AND MANURES

The liberal use of fertilizers nearly always plays an important part in vegetable growing. There is almost no soil naturally so well stocked with fertility that it can be very long cropped intensively, and with greatest profit, without the use of fertilizers.

Furthermore, on account of location and ability to produce early crops, soils of low natural fertility are often the ones best adapted to trucking purposes. Principles regarding the maintenance of fertility in connection with vegetable growing are not radically different from those applicable in general farming; but considerations of earliness, quality and price of crop, together with peculiarities of soil, make necessary the more extended and special use of fertilizers. The maintenance of organic matter is here as everywhere of prime importance, and the use of any amount of high-priced easily soluble plant food will not make up for a lack of it. If chemical fertilizers alone are depended upon, the tendency is for it to require more and more of them each year to produce the same results, and a condition may soon be reached where their cost will equal or exceed the profit from their use.

The principles of crop rotation are also, from a fertility point of view, just as important in connection with vegetable growing as in general farming. It is much more difficult to maintain satisfactory yields when any one crop is grown continuously on the same land than if it is grown in a systematic rotation with other crops. However, special demands may sometimes make it advisable to sacrifice something in yield for the sake of specializing in a certain crop.

Manures and Green Manures

In the vicinities of cities stable manure is very largely depended upon to keep up fertility. Where this can be had in liberal amounts no chemicals may be needed and no other provisions made for keeping up organic matter. Yet very often a phosphorus fertilizer will be profitable in addition to manure and will help produce a better quality of crop and earlier maturity. Where manure is used only in moderate quantities phosphorus should always be used with it at the rate of 300 to 1000 pounds per acre of acid phosphate. On muck soils some potash will be needed in addition, and with market-garden crops on any soil both nitrogen and potash may be needed as mentioned later on. The use of manure can be overdone on some crops, such as potatoes, and in other cases it may induce too much vegetable growth or late maturity. The remedy, then, is less manure and more phosphoric acid and potash; but with the scarcity of manure its too liberal

use is perhaps not frequent. In intense cropping where two or three crops are grown on the same land in one season, 20 to 40 tons per acre per year would not be considered excessive.

Green manures.— The use of green-manure crops is applicable where vegetables are grown on an extensive scale. Vetch, rape, cow-peas, clover or some other quick-growing crop, preferably a legume, may be sown after the vegetable crop is off and plowed under late that fall or the following spring. Under so many different conditions of climate and cropping it is a local problem as to what arrangement of this kind can be made.

Commercial Fertilizers for Sandy and Loam Soils

In planning commercial fertilizers for vegetable crops perhaps the three most important factors to consider are (1) the value of the crop per acre, (2) whether early market garden or staple truck crops are grown, (3) condition of soil, especially as regards organic matter. Variations in soil types commonly used for vegetables do not play such an important part in determining fertilization, excepting in extreme cases, as comparing muck with sandy and loam soils.

Nitrogen, phosphoric acid and potash are usually all three profitable in any fertilizer mixture for any kind of vegetable. The proportion in which they should be used will vary mainly with the kind of vegetable and amount of organic matter in the soil; and the total amount of fertilizer that can profitably be used will vary principally with the value of the crop per acre and with the condition of the soil.

Suppose that on a certain soil an application of twenty dollars' worth per acre of fertilizer will produce a 20 per cent. increase in yield of some crop. If this crop as fertilized has a market value of $75 per acre, the fertilizer application will have been made at a loss, and the amount of fertilizer might have to be cut down to five dollars' worth per acre before it would pay. On the other hand, if the crop should have a market value of say $300 per acre the heavy application of fertilizer would have been made at a good profit. There is reason to believe that in common practice the amount of fertilizers applied in vegetable growing is often too high for greatest net profit. In some experiments in potato grow-

ing on Long Island, conducted by the Geneva Experiment Station, it was found that 1000 pounds per acre of a complete fertilizer gave greater net profit than any heavier application when potatoes sold at 50 cents per bushel. And in some experiments with onion growing on muck soil near Florida, Orange county, it was found that the use of more than 1000 pounds per acre of 4-8-10 fertilizer was seldom as profitable as that amount, with onions at $1 per hundred pounds. But in the growing of market garden crops where earliness and quality are prime considerations and value per acre of the crop high, very liberal amounts of fertilizer are important. This applies to early beets, early tomatoes, early cabbage, early canteloupe, early sweet corn, asparagus, early turnips, cucumbers, early sweet potatoes and others. In these cases 10 to 15 tons per acre of manure may be applied in the fall, winter or early spring. At the time of preparing seed-bed there can be used 1000 to 2000 pounds per acre of a fertilizer high in phosphoric acid and potash, with perhaps some nitrogen in organic form, making a mixture of — say 2-8-10. At time of setting or planting use in addition 100 to 200 pounds per acre of nitrate of soda, and three or four weeks later another similar application. The nitrate of soda especially promotes rapid growth and improves quality; also increases the yield. For most crops it can be used to best advantage in the early stages of growth, and where a second application is made it should not be put off more than a few weeks from time of planting. A late application may delay maturity. In case of sweet corn a dressing of nitrate may be made when ears are beginning to form.

A general rule as regards fertilizers for general farm crops on the great majority of soils is that phosphorus is the first important element to be added in commercial form. If organic matter is used in fair amounts, nitrogen and potash need be purchased only in small quantities or can be done away with entirely. Organic matter furnishes nitrogen and helps to make available more potash from the large reserves of that element contained in most ordinary soils; but as the limitations of nitrogen and potassium are thus removed, the use of larger amounts of phosphorus becomes profitable. These same principles apply quite generally to the growing of vegetables as field crops on any but muck

soils. In such cropping it is usually a large development of fruit, roots or tubers that is desired rather than a rapid succulent vegetable growth. Also the crop has a much longer time to grow than early garden crops and so can use more slowly available plant food. This applies to the growing of such crops as potatoes, onions, late cabbage, and tomatoes and other crops used for canning.

In case of early garden crops where large amounts of soluble fertilizers are needed, they can be used more profitably when the soil is well supplied with organic matter than otherwise. These quickly growing crops do not make very efficient use of the slowly available forms of plant food in the soil, and organic matter makes the soil more retentive of soluble nitrates and potash; making their use more profitable.

Fertilizers for muck soils

In this state muck land is used mainly for truck growing rather than market gardening, and fertilizer recommendations are made with that in mind. Where muck consists mainly of organic matter, as is usually the case, potash is the first important constituent of fertilizer to be used, and may be applied at the rate of 100 to 200 pounds per acre of muriate or sulphate, or 300 to 600 pounds of kainit. When potash is not available manure will take its place to some extent. Manure is always profitable on muck land, although it might at first be supposed that on account of the high nitrogen and organic matter content of muck this would not be the case. But the fresh decomposing organic matter of manure stimulates further decomposition of the muck and makes nitrogen available. Phosphorus is second in importance to potash on muck soils, but more necessary than additional nitrogen. Where commercial fertilizers alone are used on muck a mixture may consist somewhat as follows:

200 lbs. nitrate of soda or dried blood
500 lbs. acid phosphate
200 lbs. muriate or sulphate of potash

The mixture will analyze approximately 3-8-10 and may be used at rate of 500 to 1500 pounds per acre, depending mainly upon acre value of the crop to be grown.

Lime for Vegetables

The importance of using lime to neutralize soil acidity in connection with vegetable growing has been pretty generally overlooked until the last few years. The majority of vegetables commonly grown are very sensitive to an acid soil and some of them — notably beets, spinach, muskmelons — can scarcely be grown with success unless a fair amount of lime carbonate is present. The following is a list of vegetables, all of which are known from actual field tests to give much better yields when the soil contains a fair amount of lime carbonate than when it is deficient in that material:

asparagus	cucumbers	parsnip
beets	dandelion	peas
brussels sprouts	egg plant	pumpkin
broccoli	endive	salsify
cabbage	horse radish	spinach
carrots	kale	squash
celery	kohlrabi	sunflower
chard	lettuce	sweet corn
chicory	lentils	tomato
collards	muskmelon	turnip
cress	onion	

Many other vegetables may also be benefited by lime, but full data is not obtainable on the subject at present.

Objection has arisen to the use of lime on potato land since it, as any other material which tends to neutralize soil acidity, provides conditions more favorable to the development of potato scab. But potatoes are grown very successfully on land containing liberal amounts of lime, and the Rhode Island Experiment Station has shown that the use of lime on land that is acid will increase somewhat the yield of potatoes and particularly the percentage of large potatoes. Considering this and also that other crops particularly in need of lime will be grown in rotation with potatoes, it is doubtful if it is ever profitable to omit the liming of potato land that is acid simply to make it easier to combat potato scab.

A very large percentage of the sandy and loam soils in this

state used for growing vegetables are deficient in lime and would be improved by a liberal application of that material in some form. The use of certain fertilizers, particularly ammonium sulphate, dried blood, fish scrap, acid phosphate and muriate and sulphate of potash tend to increase the acidity of the soil, and this may, in a few years, give rise to much trouble if lime is not present to counteract the acidity as formed; with the use of lime this tendency is of no consequence.

Muck soils in this state are seldom in need of liming. At least those underlaid with marl at no great depth are supplied with lime from this source sufficient to keep acids neutralized.

When land is in need of lime it is advisable to apply at least two tons per acre of ground limestone or its equivalent as an initial application, and one or two tons per acre may be added every three to five years thereafter. In some cases it may be advisable to make the first application two or three times as heavy.

Ground limestone (or carbonate of lime from some source) is the most desirable form of lime to use under the great majority of conditions. This is especially true in regard to sandy soils and in cases where liming is to be done only a short time previous to planting the crop. Instances are on record of temporary injury from use of caustic lime under these conditions.

It is well to apply lime to the rough surface of the ground after plowing and so let it be well mixed with the soil by the subsequent operations of preparing the seed bed.

GOOD SEED

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Of the several factors concerned in the production of vegetables, that of good seed is without doubt the most important, although it is one which frequently does not receive the attention it deserves. Too often if the seed has the general characteristics of the kind desired and is low in price, no further questions are asked — at least not until after it has been sown and it is too late to make a change. Meanwhile the vitality may have proved to be very weak, or, this point being satisfactory, subsequent observation may show that the variety is not the one desired, is badly mixed with other varieties; or the yield and character of the product is not satisfactory.

Fig. 375.— Result of Planting Unreliable Seed: Four Types of Tomatoes From the Same Packet

In most instances undesirable results of this kind could be eliminated had proper precautions been taken at the right time. In the first place it is unreasonable to expect a high-grade product at an unreasonably low price. It may happen that not always is

the price charged and the quality of the commodity commensurate, but as a general principle there should be and usually is a considerable degree of parallelism between them. Furthermore, the sentiment produced by the attempt to purchase seeds at competition prices is not conducive to much improvement in strains.

At the present time we have no rule by which we can purchase seeds and be assured that they will give the results desired. The general seed catalogues published by the majority of the seedsmen, while fine examples of the printer's art, usually contain little of definite value to guide the prospective purchaser in the selection of the variety or strain he desires. Furthermore, almost every seedsman has a strain which he claims to be the best obtainable, and in some instances the seedsman does make an especial effort to keep his strains pure and true to type. Some of his seeds are grown under his personal supervision, while those grown by contract are in charge of men who have spent years in the business and take special care to keep the stocks pure. As a check on this work some seedsmen maintain trial grounds in order that they may acquire personal knowledge of the various stocks before they are disseminated among their customers. Other seedsmen may publish catalogues equally as attractive and make as strong claims concerning the merits of their strains, while as a matter of fact they may never have seen the stock from which it was produced or even know where or by whom grown, but simply have purchased the seed in bulk from a jobber, securing it at the lowest possible price.

Another practice far too common in the seed business is that of renaming varieties. In a test of cabbage conducted by the writer last year, the variety Jersey Wakefield, which has been on the market since about 1840, was grown under the name of Early Pointed, Earliest, Standard Early and New Greenpack. In each case the seed was purchased a few months previous to the time it was sown and was thought to be a distinct variety.

In view of the uncertainty concerning the purchase of seeds, it should need little argument to show the importance of making a preliminary test to determine the relative merits of the variety or strain previous to the time it is expected to be used for the general planting. In order to make this test of value, seed of the

same variety should be secured from different sources, having enough from each to make the general planting the following year in case it proved satisfactory. Having secured the seed, a germination test should be made of each to determine its value in this respect as well as to obtain an index to the rate of sowing. This germination test will probably show some variations within strains, while the vigor of the seedlings will also probably vary as may be seen by Fig. 376.

FIG. 376.— VARIATION IN GERMINATION OF JERSEY WAKEFIELD CABBAGE SEED

When the field planting is made, fifty plants will be sufficient. As they approach maturity, a study of the respective strains will show differences regarding general type, time of maturity, solidity of head and general productiveness. In order to secure accurate data, weighings should be made of the heads of the respective strains. The following table shows the variability of six strains of Jersey Wakefield cabbage grown the past season, each of which was purchased from a seedsman of good reputation.

Rec No.	Date planted	Yield per acre to $\frac{7}{24}$	Total Yield per acre	Average weight of heads
Strain 1.....	May 5	2.33 tons	8.00 tons	1.65 lbs.
Strain 2.....	May 5	3.17 tons	7.00 tons	1.45 lbs.
Strain 3.....	May 5	3.17 tons	7.50 tons	1.50 lbs.
Strain 4.....	May 5	0.33 tons	8.00 tons	1.70 lbs.
Strain 5.....	May 5	5.00 tons	7.34 tons	1.60 lbs.
Strain 6.....	......	5.00 tons	8.34 tons	1.70 lbs.

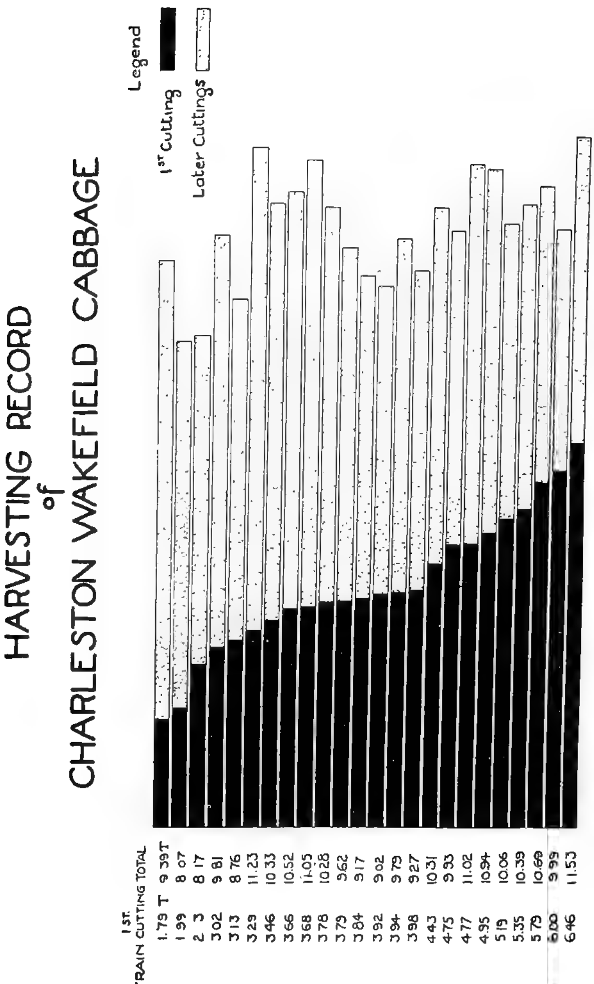

FIG. 377.— VARIATION IN YIELD OF STRAINS OF CHARLESTON WAKEFIELD CABBAGES

Strain 6 was secured from a private grower on Long Island who advertised seed for sale at $5 per pound, with the understanding that the purchaser could sow half of it, and if he was not pleased with the result at the close of the season could return the part which remained and have the charge canceled, or if it proved satisfactory pay the advertised price. A study of the table shows that the seed was the best of the test, and from the standpoint of earliness of maturity was far superior to strain 4. In fact it will be seen that the difference in the financial value of the crop at the first cutting from one acre would approximate $140. The test also shows that some of the other strains were quite desirable. Thus when the general planting is made the following year it may be done with the assurance that the seed sown will give reasonably good results. Certainly there are few operations with which the gardener is concerned which will yield as large returns for the time and money invested.

Fig. 377 shows the variation in strains of Charleston Wakefield cabbage, each of which was secured from a different seedsman.

In this discussion we have concerned ourselves only with the good seed question with respect to cabbage. However, there is abundant evidence to substantiate the belief that the facts here illustrated are applicable to vegetable crops in general as well as to farm crops.

THE SEED BUSINESS FROM THE DEALERS' STANDPOINT

H. W. GORDINIER, TROY, N. Y.

Here we picture the seed business which, in at least one respect, is the most unique in the world. I refer to the non-warranty with which every reliable seedsman sells his stock. It is a fact that we cannot buy a pound of seed, a ton of seed, a bushel of seed, a pint of seed, from any reliable seedsman that does not contain the following statement, either on the package or in the bag: "John Doe & Co., gives no warranty, express or implied, as to description, quality, productiveness or any other matter, of any seeds they sell. They will not be in any way responsible for the crop. If the purchaser does not accept the seed on these terms it is to be returned at once."

With almost anything else we buy we can tell something of the quality of the goods, and that about which we do not know the salesman will give us a guarantee. However, the seedsman will guarantee nothing. Therefore, it is apparent that the seed business is one in which the good reputation of the seedsman counts for much — very much. Indeed, it is his stock in trade.

WHERE THE SEED COMES FROM

With the exception of peas, beans, corn, lettuce, onions and the vine seeds, from 50 to 75 per cent. of the best vegetable seed comes from Europe. From Denmark we get our cauliflower and varieties of selected cabbage. From Germany we get choice stocks of flower seeds and selected beets, mangels, vetches and rapes. Indeed, we get at least 50 per cent. of our flower seed from Germany, with the exception of sweet peas which are grown in California on about 3,000 acres. From France we get seed of the finest root crops, such as carrots, parsnips and radishes, and

French-grown celery seed commands the very highest price in the American market. (I take the following quotations from to-day's list: "Golden Self Blanching Celery, true French stock, $18.00 per pound. American-grown Golden Self Blanching seed $5.00 per pound.") From England we receive various seed crops, especially mangels, turnips, parsnips and herbs, together with special varieties of sweet peas. From Belgium we get the sugar beets and special sorts of mangel-wurzel. This list is by no means complete, but I simply site these particular varieties to show that the whole world contributes its share of seed for American growers.

Cannot we produce all these seeds in this country? We can; but why don't we? It is simply a question of expert labor. We buy these vegetable seeds in Europe and devote our time to the cultivation of wheat, corn, cotton and various other crops.

HOW THE SEED IS BOUGHT

The seed business is also unique in its uncertainty. We never know what quantity of seed we shall receive, for contracts are made one, two, three and four years in advance of the harvest. Our contracts always read that we must stand the shortage on any failure of the crop, but the contractor agrees to plant the necessary acreage to produce the quantity for which we contract. To-day I contracted with an English house for the growing of 4,000 pounds of Norbitan Giant Mangel to be delivered after 1917. I need just this amount for my normal trade. How much will this house deliver? I have not the least idea.

There is a very limited open market for the big seedsman of the country. If contracts are not delivered in full it means an almost universal shortage in that particular variety. As an instance of this I site a personal case which occurred this year. I had a contract with a French house for Golden Self Blanching celery, but the crop was a failure and it was absolutely impossible for me to buy more than a tenth of what I needed for my normal trade, and this was purchased in the open market at an advance of 270 per cent. over the price at which the seed had been contracted.

HOW THE SEED IS CARED FOR

When the seed arrives from Europe and has been released from the custom house, it is delivered immediately to our warehouses. Then comes the most exacting part of the business, known as "stocking the seed," and, since so much depends upon the accuracy of this work, we allow only one man to stock it. On him rests the entire responsibility. He tags each bag with the English name of the seed contained therein and gives to each bag a distinctive number by which it is identified while the seed is in our hands. If this man makes a mistake in tagging, his error will not be discovered until the damage has been done, and then not by ourselves but by our customers, for it is only in the growing that such errors are brought to light.

However, we generally carry a two-years' supply and make a trial planting ourselves to determine positively the exact variety. Sometimes, owing to short crops, we can not make such a trial; hence we protect ourselves with the non-warranty I mentioned. We can tell nothing about our stock without such tests. About thirty varieties of radishes are listed, each distinct as to color, size and shape, yet the seed is all alike. We also list about fifty varieties of cabbage, each distinct as to time of maturity and size and habit of growth, yet the seed is all alike.

The number is entered on a card with all other information, such as the name of the grower, the year grown and the variety and test. The test, however, can not be entered until 100 seeds have been taken from each bag and sent to the official tester for germination test. After the report of the test is returned the seedsman has a farily complete record of his stock. Is it correct? He does not know — for he will have to wait one full season to determine that. The proof of the record is only in the growing of the seed.

We have now the only positive information of our seed stock available. We know just how many seeds out of every hundred will grow under absolutely perfect conditions. A grower may buy that very lot, and it may never show up in the garden. He may register a complaint on the quality or the variety and the poor seedsman will hide behind his non-warranty. He need not say that the seed was no good because it did not grow for

him, because the seedsman can look up his records and learn the exact vitality of the seed. Perhaps the seed did not grow owing to conditions over which the seedsman had no control; such as poor planting, lack of water, or too much water, or for want of other requirements necessary to its growth.

I know there is a popular belief that the seedsman keeps the good stock and sells the dead. While he does not keep the good stock, he nevertheless does sell the dead stock. He sells the spent, or dead, celery seed to wholesale grocers for flavoring. He sells the spent pumpkin and squash seed to druggist for medicinal uses. The spent beans and peas are sold for food in the large cities. All the rest of his dead stock he really and truly destroys.

His success depends entirely upon his reputation as a seedsman and this in turn rests solely on the growing quantity and quality of his seeds. Therefore, in spite of the non-warranty used by every reliable seedsman, one need have no hesitancy in placing an order with any leading seedsman in the county, for he will do the very best he can to fill it only with high-grade seed of strong vitality.

GROWING EARLY PLANTS

E. H. Hallett, St. Johnsbury Center, Vt.

A successful crop from the garden depends largely upon the plants we use. Many lose sight of this and use anything that is a plant, regardless of its vitality and ability to produce.

Let us first consider that plant and animal are practically the same — both have to eat, drink and breathe — therefore essentially they should be cared for in about the same way. The dairyman of today, if he wishes to raise a cow that is a great producer, must start as soon as life begins. He must take charge of the animal every day seeing that it has the proper amount of feed, drink and air. He must see that not a day passes but that the animal increases in growth. If at any time it has not received the necessary feed and care its capacity for production may be injured.

Plant life is exactly the same. We find when talking with people about plants that they want them stocky, well-colored and vigorous for setting. But do we always get such? No; because we do not take enough care in growing them. Often we who grow for the market are so eager to get bigger returns from the amount of space that the plants have to suffer.

FORCING HOUSE

In growing early plants it is necessary, especially in this northern country, to have a greenhouse for sowing the seed and forcing to the time of transplanting. Beginners are sometimes frightened at the expense of this, but they need not be, for a house that is small, with good light and well-heated will do as well as one costing thousands of dollars. Two hundred dollars will build one in which 50,000 plants can be started as well as in a more expensive house.

FIG. 378.— TOMATOES GROWN ON STAKES. FRUIT SUPERIOR TO THAT GROWN UNDER ANY OTHER METHOD

The first very necessary thing is heat. We find the seeds themselves are very sensitive to heat, and by experimenting, the same seed will range from 40 to 99 per cent. in germination according to the amount of heat. We find the nearer 75 degrees the temperature is kept the better.

SOWING THE SEED

The manner of sowing the seed is very important. The old-time way of sowing broadcast in flats or beds should be abandoned. There are always some that will be crowded by this method and thus grow slender and become practically worthless. We would recommend always sowing all seeds in rows. This will give all the same chance if covered in the same depth and all receive the same amount of sun — which plants need very much.

Each grower must determine when to sow his seeds; this depends upon the time they usually will be liable to go into open ground. I allow about six weeks for tomatoes, cabbage and cauliflower, and twelve weeks for celery.

Flowering plants may be grown to good advantage with the vegetables as the greenhouse can be used after other plants are out in hotbeds. The following flowers are most called for: Asters, Verbenas, Petunias, Zinnias, Salvias and Pansies. Many more plants can be grown per square foot.

In the selection of flower seeds, buy only the best and those that have been tried out. One does not want to be disappointed at the close of the season by not getting large and handsome flowers.

The methods of growing plants are practically the same as for vegetables.

DISEASES

Diseases that attack plants in the seed bed should be well looked after. Perhaps the one having done the greatest amount of damage is what is known as "damping off." This is a fungous disease that attacks the plants at the surface of the earth, and is caused by an over amount of moisture there. This excess moisture soon decays the shanks of the plants which drop over and in time die. Some recommend transplanting as soon as this condition is

found, and placing sand around the plant when set. We find that a better method of prevention is by covering all seeds with a fine, sharp sand, instead of covering with the same soil. This gives a very quick and proper drainage. Since adopting this method, seldom, if ever, is a plant found diseased. Care should be taken to keep the surface quite moist until the plants have broken the ground. Then the time has arrived when the work must be thoroughly looked after — that not an hour passes but what the small plants grow. Give plenty of heat and ventilation but avoid heavy draughts directly upon the plants.

Fig. 379.— Simplest Form of Manure Hotbed. The Frame is Placed on a Pile of Fermenting Manure

TRANSPLANTING

Transplanting is a very important part of the work. Plants should first be set when the third leaf appears and should be evenly spaced so that all will have an equal chance for development of the root system. A plant without roots is worthless. Some fear the cutting of any roots, and thus advocate potting plants instead and shifting from time to time as growth advances; but we find the cutting of roots by transplanting several times produces a plant capable of feeding more rapidly, and one which will produce more fruit.

Great pains should be taken not to allow inside plants to become too tender before removing into hotbeds. We find that tomatoes and celery do best if removed to hotbeds to finish up. Cabbage and cauliflower do best in cold frames.

In transplanting tomatoes into beds care should be taken to space evenly. Usually good plants can be grown three by five inches, allowing them to get from ten to twelve inches tall when put upon the market. Keep well ventilated; the last few days the glass should be entirely taken off.

Sometimes the green aphis works havoc with them. Tobacco smoke will rid the plants of this pest, but it must be used often and should not be allowed to remain in the building too long.

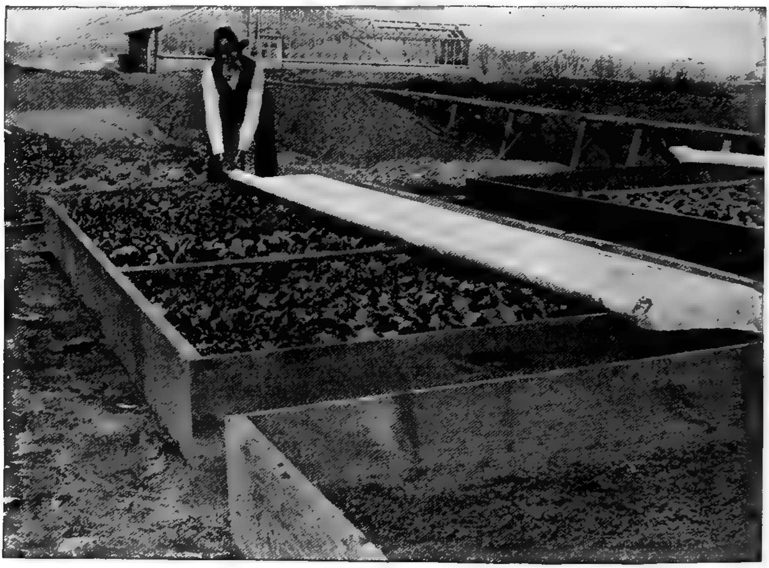

FIG. 380.— A CLOTH-COVERED COLD FRAME

PREPARING FOR MARKET

My method of putting up for the trade is as follows: All small plants are well wrapped in damp moss. These can be sent by parcel post very satisfactorily. Tomatoes are more trouble. They are shipped in boxes or flats nine by twelve inches, and three inches deep, with a strip of shingle nailed in each corner of the box. The plants are cut out and placed upright in these boxes, which hold just twelve plants, after which twine is tied around

the tops of strips. This keeps the plants from tipping and being damaged. They may be shipped by freight or express without trouble.

Grow only good plants and good prices can always be obtained for them.

RETAIL PRICES RECEIVED

The following is what we receive for the different plants: Tomatoes, 50 cents per dozen; cabbage, 50 cents per hundred; cauliflower, $1.00 per hundred; celery, 90 cents per hundred; peppers, 30 cents per dozen. For Asters, Petunias, Zinnias and Verbenas we receive 25 cents per dozen; for Salvias, 50 cents per dozen; Pansies, 25 cents per dozen.

After giving a brief outline of growing early plants, we must bear in mind that to be successful in the growing of plants and vegetables one must love plant life. He must know the exact needs of each plant; he must be quick to detect insect pests and plant diseases and immediately apply a remedy. Only a few hours sometimes will mean the loss of the entire crop. It is better to use a preventive rather than risk the use of cure later.

DISEASES OF VEGETABLES

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CAUSES OF DISEASES

Diseases of plants result from several causes. Unsuitable soil and weather or improper cultural methods are often the cause of unhealthy plants. Insects are more or less injurious to all crops. Many diseases result from the growth within affected plants of minute parasitic plants known as fungi and bacteria. Other diseases, which appear to be of importance in New York State to the growers of the vegetables treated in this bulletin, are briefly discussed.

METHODS OF CONTROL

Vegetables can not be cured of disease as can men and animals. They must be protected from the attack. The method of control to be employed for a given disease is determined by its cause and by the nature of the crop attacked. Evidently diseases resulting from conditions of soil, weather or culture can be avoided by making conditions suitable or by growing crops, varieties or strains of plants which are not injured by the conditions. Control measures to be employed against the many diseases resulting from the attacks of parasitic fungi and bacteria depend primarily on the nature and habits of the parasite.

Crop Rotation. Many parasites live from year to year in the soil and will die out and disappear if crops are so rotated that susceptible crops are not grown in an infested field for a few years.

Soil Sterilization. Several diseases, resulting from parasitic organisms which gain entrance to the plants from the soil, are very effectively controlled by soil sterilization. This treatment is

limited by its high cost to use in greenhouses, plant beds and similar places, where small areas bring large returns.

Steaming is the most satisfactory means of sterilization. Three methods are commonly used. A galvanized iron pan, five to ten inches in depth and any convenient size, is inverted over the soil and live steam passed into it. A drag-like arrangement with many perforated perpendicular pieces which are jabbed down into the soil is occasionally used. Many prefer to lay perforated iron or galvanized pipes in the soil horizontally at a depth of two to seven inches and a foot or more apart, covering the surface with canvas or paper to hold the heat. A steam boiler giving at least 40 pounds pressure, and better 80 to 100, should be used. Steam is usually applied for one to two hours. For the treatment to be fully effective all parts of the soil to a somewhat greater depth than worked must be heated to a temperature of around 200 degrees, Fahrenheit, and held at that temperature for a time.

Drenching the soil with formaldehyde solution is sometimes as effective as steaming, but can be recommended only for very small areas. Use one pint of 40 per cent. formaldehyde to six or seven gallons of water, and apply with a sprinkler at the rate of one gallon per square foot. A weaker solution is often recommended but can not be relied on to give satisfactory results. Crops must not be started until two weeks after the application.

Clean Seed and Seed Treatment. Several parasitic fungi and bacteria are perpetuated in or on the seeds of the crops, and the resulting diseases can be wholly or in part controlled by selecting seed free from the parasite or by treating the seed to kill the parasite. Where the parasite is within the seed, methods of killing it have not been determined, and the selection of disease-free seed must be practiced. Parasites on the surface can usually be killed by a short soaking in a weak solution of formaldehyde or corrosive sublimate.

Resistant Varieties. One of the most promising methods of controlling vegetable diseases is by the development and use of disease resistant varieties and strains. There are very few strains and varieties of vegetables which resist disease, but there are sufficient to indicate great possibilities. Growers can accomplish considerable in obtaining more resistant varieties and strains. If

a plant is decidedly more free from disease than its neighbors, save seed from it and try it out the next year. Plant different varieties and examine for differences in disease resistance.

Spraying. Many blight and dead spot diseases can be controlled by applying some material which is destructive to the causal parasite but harmless to the crop. For perfect control all susceptible parts must be kept coated with the spray material in order to prevent entrance of the parasite, for once entrance has been gained spraying is useless. Spray before rains, not after, for the parasite requires moisture to gain entrance to a plant, and well-made spray mixtures do not wash off. Bordeaux is the standard material for vegetable spraying. For fruits lime-sulphur has largely taken the place of bordeaux, but it has in no case been sufficiently tested on vegetables to warrant its substitution for bordeaux. Careful tests have shown that in some cases lime-sulphur actually checks the growth of vegetables.

Bordeaux, 5-5-50, which is the formula usually used, consists of 5 pounds copper sulphate, 5 pounds high-grade stone lime and 50 gallons water. The copper sulphate is dissolved by suspending in a sack in the top of a few gallons of water in a wooden vessel. The stone lime is slaked in a separate vessel by adding water a little at a time. Both are then diluted to 25 gallons and poured together in this diluted condition. After thorough stirring the mixture is ready for use. Fresh hydrated lime may be used in place of the stone lime. If there is any doubt about the lime being high-grade and fresh, get an ounce of yellow prussiate of potash at a drug store, dissolve it in a pint of water, and add a few drops to the well stirred bordeaux. If the solution shows no change in color the bordeaux is all right, but if it turns dark brown as soon as it strikes the bordeaux, the lime was either low-grade or air-slaked, and the bordeaux will burn foliage if used. Add lime from a fresh supply until the prussiate solution does not change color.

Where smooth glossy plants like asparagus are sprayed, it is advisable to use a sticker with the bordeaux. Boil 2 pounds resin, 1 pound sal soda crystals and 1 gallon water in an iron kettle until clear, which requires one to one and one-half hours. Add this to 50 to 100 gallons of bordeaux.

For best results in spraying at least 100 pounds pressure must be used. It is usually impossible to obtain over 50 pounds pressure with hand sprayers. By expending much time and labor satisfactory spraying can be done on small areas with hand sprayers, but they are out of the question for field work. Use a horse-drawn sprayer which derives power from the wheel or a gasoline engine.

GENERAL DISEASES

Damping Off. Seedlings and weak soft plants are subject to rotting off at the surface of the soil and consequent toppling over. Damping off is most injurious to plants grown indoors or under crowded conditions. The disease results from the attack of any one of several species of fungi.

Injury can often be largely avoided by so regulating moisture, temperature, ventilation and spacing of plants as to produce as stocky, vigorous plants as possible. High temperatures and an excess of moisture favor the growth of the causal fungi and should be avoided. Where trouble with damping off has been experienced it may be expected that the same soil will continue to give more or less trouble. This can be overcome to a large extent by using new soil or by sterilizing, for which see soil sterilization.

Root Knot or Nematode Galls. Root galls (Fig. 381), varying in diameter from one-thirty-second to one-half inch, occur on a great variety of plants, resulting in diminished vigor and decreased yields. They are due to the entrance into the roots from the soil of microscopic worms. In this climate injury usually occurs only in greenhouses, for outside the worms are largely killed by the cold of winter. In badly infested houses lettuce and radishes are not appreciably injured, but the yield from tomatoes is noticeably lowered and cucumbers are almost a failure. Thorough steam sterilization of the soil is the only remedy that can be relied on to eradicate the disease.

ASPARAGUS

Rust (*Puccinia asparagi* DC.), Fig. 382. Rust is the most common disease of asparagus and very destructive in some sections. Disease lesions do not occur on shoots cut for market but older bushy tops become covered with reddish or black pustules.

The life of affected tops is considerably shortened, thus preventing the normal manufacture and storage of food in the roots and shortening the succeeding season's yield.

Bordeaux, 5-5-50, with resin sticker added, applied three to five times at intervals of ten days after cutting ceases, reduces

FIG. 381.— ROOT KNOT OF GREENHOUSE CUCUMBERS

the amount of disease. Spraying has not proved generally satisfactory on account of expense and incomplete control. The development of disease resistant strains bids fair to solve the problem. The United States Department of Agriculture has bred a

FIG. 382.— ASPARAGUS RUST

strain of asparagus which is immune to the disease under Massachusetts conditions and seed has been distributed for trial in other localities.

BEAN

Anthracnose (*Colletotrichum lindemuthianum* Bri. & Cav.), Fig. 383. This is a fungous disease also known as rust or pod spot. Rusty brown or reddish sunken spots occur on the pods with similar spots on leaves and stems. Seed from disease-free regions or from selected disease-free pods will, it is believed, produce disease-free crops. Seed treatment or hand picking of seed is useless. Spraying has not been profitable.

FIG. 383.— BEAN ANTHRANCNOSE

Blight (*Pseudomonas phaseoli* Erw. Smith), Fig. 384. Irregular water-soaked patches appear on leaves, stems and pods, which later become dried out and brownish in color. Diseased seed is the main source of the bacterium which causes the disease. Statements above in regard to the control of anthracnose are largely applicable.

CABBAGE

Black Rot (*Pseudomonas Campestris* Erw. Smith). This disease is readily distinguished by the presence of brown or black veins in leaves and cross sections of leaf stalks and plant stems. Badly affected plants are stunted and many of the lower leaves may drop off. The disease originates from the presence of a parasitic bacterium either on the seed or in the soil. All danger of disease from seed is removed by soaking for fifteen minutes in a solution of corrosive sublimate, one ounce dissolved in seven gallons of water, or in formaldehyde, one pint to thirty gallons of water. Susceptible crops should not be grown on soil where the disease has occurred until a few years have elapsed. Cauliflower, rape, kale, turnips, wild mustard and other cruciferous plants are also susceptible.

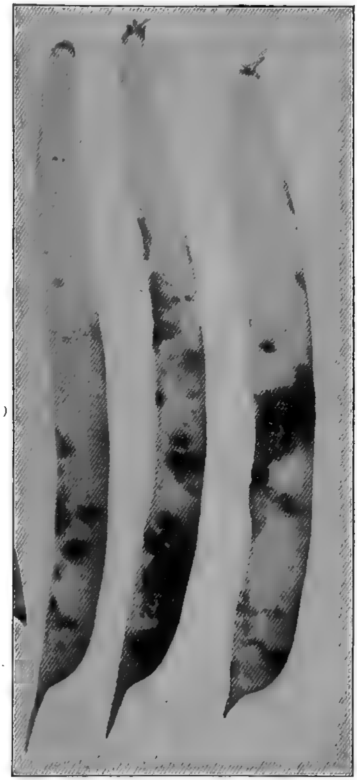

FIG. 384.— BEAN BLIGHT

Club Root (*Plasmodiophora brassicae* Wor.), Fig. 385. Unsightly swellings occur on the roots of cabbage, cauliflower, turnips, radishes, shepards purse, wild mustard and other related plants. The causal parasite lives in the soil. It is best controlled by rotating crops so that a susceptible crop is grown on a given field only every fourth to seventh year, but in the meantime the field must be kept free from weeds on account of the susceptibility of many weeds. If infested soil must be used apply lime at the rate of three to five tons per acre. Apply and harrow into the soil the fall before planting, or better, a year or two before.

FIG. 385.— CLUB ROOT OF CABBAGE

CAULIFLOWER

Black Rot and Club Root, discussed under cabbage, are the important diseases.

CELERY

Blight (*Septoria petroselina* Desm., var. *apii* Br. & Cav.), Fig. 386. It is probable that the yellowing of celery leaves, resulting from unfavorable soil and weather conditions, is sometimes

FIG. 386.—CELERY BLIGHT

called blight. True blight is, however, caused only by the attack of a fungus. It can be readily distinguished from all other troubles by the presence of brown dead spots in the leaves and rusty brown areas on the stalks, in both of which there occur small black specks, readily observed only on close observation. Thorough spraying with bordeaux, 5-5-50, effectively controls the disease. It can sometimes be checked to a certain extent by beginning spraying after it has appeared, but generally satisfactory

results are obtained only where spraying is begun as soon as the plants become established in the field and repeated at regular intervals throughout the season. Spray every ten days.

Pink Rot (*Sclerotinia libertiana* Fuckel), Figs. 387 and 388. This fungous rot is sometimes very destructive to celery in trenches and rarely in cold storage. Many other rot fungi attack stored celery, but none cause such a rapid and complete decay. The disease is readily distinguished by the presence on softened parts of dense cottony wefts of mold, within which black irregular bodies 1/32 to 3/8 inch in diameter are developed. These are the resting bodies of the fungus and serve the purpose of seeds. The same fungus attacks lettuce, carrots, cabbage and other plants. It can always be distinguished by the mold and resting bodies.

Control methods are uncertain. Probably much can be done to reduce the amount of disease on all attacked plants by diligently removing and destroying all diseased material bearing the fungus resting bodies. Celery trenches should be ventilated as much as possible, for heat and moisture favor the growth of the fungus.

CORN

Smut (*Ustilago zeae* Ung.). The familiar smut boils occur on corn wherever it is grown and often results in noticeable losses. The causal fungus remains in the soil from year to year or is brought in with manure where infested corn is fed. The fungus is killed in silos. Crop rotation and the use of uninfested manure reduces the disease. Go through the fields several times each year and cut out and burn the smut boils before they burst open. This continued yearly will result in continued diminution of smut.

CUCUMBER

Wilt (*Bacillus tracheiphilus* Erw. Smith), Fig. 389. Usually whole plants show a rather sudden wilting with no apparent cause. The disease results from the clogging of the water vessels of the plant by a bacterium, which gains entrance to healthy plants largely through the feeding punctures of striped beetles and other insects. Cantaloupes, pumpkins and squashes are also subject to the disease. Sure methods of control are unknown, but it is probable that crop rotation, the early removal and destruction of

Fig. 387.—Celery Pink Rot

diseased plants, and the control of striped beetles and other insect enemies are of value.

Downy Mildew (*Plasmopora cubensis* Humphrey), Fig. 390. This is a very destructive disease to both cucumbers and cantaloupes in regions where it commonly occurs, but outside of Long Island it seems to appear only occasionally in this state. The first

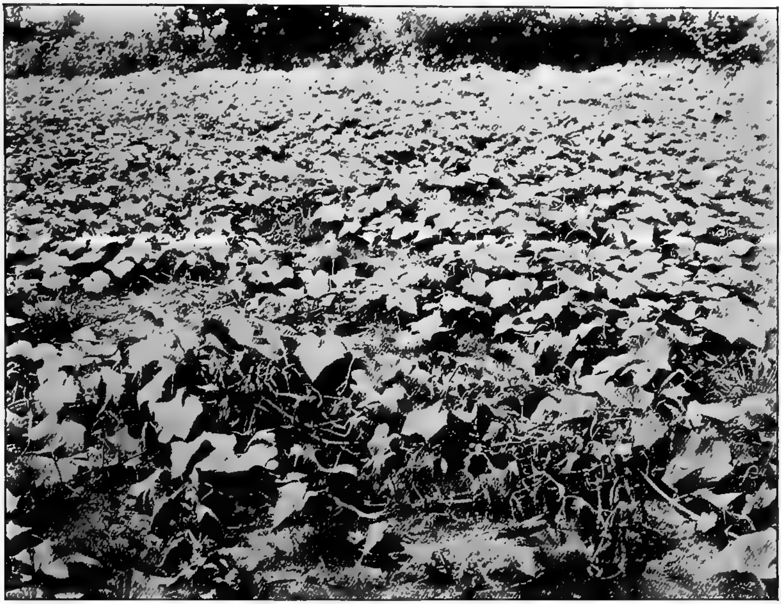

FIG. 389.— CUCUMBER WILT

symptom is the appearance of yellowish angular spots in the older leaves, which increase in number and size, spreading to younger leaves and finally killing practically all leaves.

Thorough spraying with bordeaux, 5-5-50, controls the disease and is very profitable where it is destructive. Begin spraying when the vines begin to run and repeat every week or ten days throughout the season. There is little use to begin spraying after the disease appears.

Leaf and Fruit Spot Diseases. There are several distinct diseases, resulting from the attacks of several species of fungi, which cause dead spots in leaves and fruits. Wherever sufficiently destructive to warrant control measures, all can be prevented by spraying as for downy mildew.

White Pickle, Fig. 391. Fruits are light colored and stunted. They are often mottled with yellow and green. The green blotches may stand out as warts. The leaves turn yellow and affected plants eventually die. The disease has been known only a few years but occurs in many localities. Nothing is known in regard to its nature, cause or remedies. The same or a very similar disease is destructive to greenhouse cucumbers in some localities.

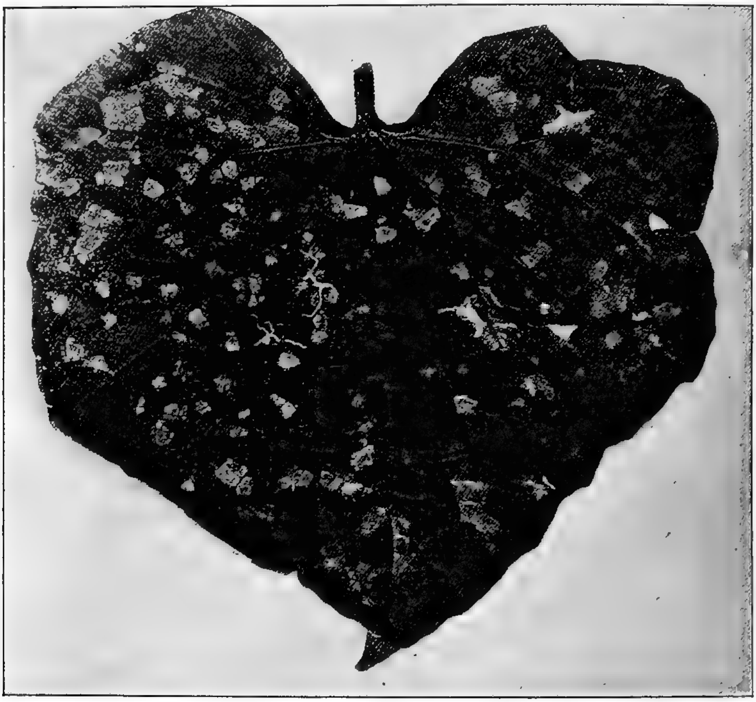

FIG. 390.— CUCUMBERS DOWNY MILDEW — EARLY STAGE

LETTUCE

Tip Burn. The edges of the leaves die and turn brown, making the product less salable and in severe cases decreasing yields. Various combinations of climatic conditions, resulting in a too rapid loss of moisture from the lettuce leaves, are responsible for the disease. It is usually brought about by two or three warm, moist days, resulting in a soft, watery growth, followed by a warm, bright day, when there is a rapid loss of moisture. Under glass

such conditions can be avoided but no remedy is known for outdoor lettuce. The only hope lies in obtaining varieties or strains less subject to the disease.

Rhizoctonia Rot (*Corticium vagum* B. & C., var. *solani* Burt.), Fig. 392. This is a very destructive disease of outdoor lettuce in this state and is of considerable importance in greenhouses. The rot begins where the bottom leaves rest on the ground and gradually works up into the head, destroying the blades of the leaves and usually leaving the midribs and stem more or less intact. Under glass, care in watering, so as to keep the leaves and surface

FIG. 391.— CUCUMBER WHITE PICKLE

of the soil as dry as possible, usually holds the disease in check. Outdoors little can be done towards controlling it, but thorough drainage and frequent cultivation are of value. In greenhouses soil sterilization, preferably by steaming, insures crops free from the disease, but is out of the question for fields on account of cost.

Botrytis Rot (*Botrytis cinerea* Pers.). This rot is of no importance outdoors but is occasionally destructive under glass. Diseased parts are covered with a dirty grey fuzzy mold. The

FIG. 392.— RHIZOCTONIA ROT OF LETTUCE

disease attacks mainly weak plants and can be largely avoided by obtaining a strong vigorous growth. Soil sterilization is probably of little or no value.

Sclerotinia Rot (*Sclerotinia libertiana* Fuckel). This disease appears to be of minor importance in this state. Attacked plants very quickly collapse into a soft slimy mass. It is caused by the same fungus as celery pink rot and can be recognized by the mold and fungus resting bodies mentioned under that heading. The disease can be practically eliminated from both greenhouse and outdoor beds by the early removal and destruction of affected plants in each crop. Soil sterilization is effective.

MUSKMELON OR CANTELOUPE

The important diseases are, with the exception of white pickle, the same as of cucumber and the same remedies are effective.

ONION

Smut (*Urocystis cepulae* Frost), Fig. 393. This disease is destructive in many localities where onions have been grown for several years with little or no rotation. It attacks only onions grown from seed. Black streaks occur in leaves and bulbs, which when broken open are found to be filled with a dark powder similar to the smut powder of the familiar grain smuts. The disease is caused by a fungus which gains entrance to the young seedlings from the soil.

The application of a weak formaldehyde solution in the furrow with the seed at planting time is a satisfactory and extensively used remedy. The solution is made at the rate of one pound of 40 per cent. formaldehyde to 25 gallons of water. It is applied at the rate of 150 gallons or more per acre by means of a can and delivery tube attached to the seed drill. Heavy rains within 24 hours after planting may greatly reduce the efficiency of the treatment. A mixture of 100 pounds powdered sulphur and 50 pounds lime, drilled into the furrow with the seed, is of value, but in general less efficient than formaldehyde.

Blight (*Peronospora schleideniana* De Bary). This is a fungous disease similar to potato blight. Thorough spraying at regular intervals of about ten days with bordeaux, 5-5-50, con-

taining resin sticker might be of value in preventing it. The disease usually appears only occasionally and then often not until late in the season. Crops are only occasionally noticeably shortened. Present information does not warrant spraying.

FIG. 393.— ONION SMUT; ALL DISEASED EXCEPT THREE LARGEST

PEA

Blight (*Mycosphaerella pinodes* Berk. & Blox.). Fig. 394. This disease causes marked losses in many localities where peas are extensively grown. Brown rotten spots appear on the stems of young plants and later dead spots develop in leaves and pods. The disease results from the attack of a fungus which lives over winter in the seed and in pea roots, stubble and straw. Practice

FIG. 394.— PEA BLIGHT

crop rotation. Do not put pea straw on land where peas are to be grown. The disease is introduced into fields with manure where pea vines are fed, but the disease germs are killed where the vines are used as silage. Use seed from disease-free crops. Blackish brown spots on seed are a sure indication of the disease.

TOMATO

Blight (*Phytophthora infestans* De Bary). The potato blight fungus occasionally attacks tomatoes, producing a similar blight. Spraying with bordeaux, 5-5-50, will check the disease and is advisable when it appears. Systematic spraying, as for potatoes, probably would not be profitable.

Leaf Mold (*Cladosporium fulvum* Cke.). Yellow and dead areas, covered on the lower surface by an olivaceous mold, appear in the leaves. This is primarily a greenhouse disease. Thorough spraying with bordeaux, 5-5-50, every ten days is usually recommended. Spraying has, however, not proved generally satisfactory. The disease can be largely avoided by keeping the tomato foliage and the greenhouse atmosphere as dry as possible.

Leaf Spot (*Septoria lycopersici* Speg.). Small angular dead spots occur in the leaves eventually causing them to dry and fall. Stems and fruits are also spotted. Three or four applications of bordeaux, 5-5-50, early in the season are said to control it.

Blossom End Rot. The blossom ends of half grown and larger fruits become black and more or less sunken. The nature of the disease is not fully known. Various soil conditions, including a sudden decrease in water supply, favor it. Varieties are said to differ in susceptibility.

SOME INSECTS INJURIOUS TO VEGETABLES

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CABBAGE ROOT-MAGGOT

The cabbage root-maggot (*Pegomya brassicæ*) is one of the serious pests to cabbage in New York State. The parent insect of the maggot is a small fly (Fig. 395) which resembles in general appearance the house-fly, but is considerably smaller, being only about one-fifth of an inch in length. The flies appear in

Fig. 395.— Cabbage Root Maggot (Greatly Enlarged)

the spring, usually the first half of May, and deposit their whitish eggs on the soil or in crevices of the soil close to the stem of the cabbage plant. Here the eggs hatch and the maggots attack

the plant, eating out small channels along the underground part of the stem and the roots. If the maggots are present in any numbers the plant will begin to wilt in a few days and eventually will die. In three or four weeks the maggots become full-grown and change to brown oval objects termed *puparia*, which are usually an inch or so below the surface of the soil. In about two weeks an adult fly emerges from each of the puparia and is soon ready to deposit eggs for a second brood. The insect passes the winter as a puparium in the soil. This insect is a serious pest of cabbage plants in the seed-bed as well as of plants after they are set in the field.

Control. Plants in the seed-bed may be protected by setting up boards on edge about the bed and then nailing muslin across the top. The dirt should be heaped up around the lower edges of the boards in order to prevent the flies from crawling under and gaining access to the plants. The muslin should be removed about ten days before transplanting time so as to harden the plants and prepare them for setting in the field.

FIG. 396.—(A) TARRED PAPER CARD PROPERLY PUT ON; (B) A CARD CARELESSLY APPLIED THAT WILL NOT PREVENT

Plants in the field are best protected by placing hexagonal tarred paper cards about the stems close to the soil. These cards can be purchased ready cut from Joseph Harris Co., Coldwater, N. Y., at $1.50 per thousand. They can be quickly and economically applied in the field (Fig. 396).

IMPORTED CABBAGE WORM

The imported cabbage worm (*Pontia rapæ*) is known as the white cabbage butterfly and although it is common now wherever cabbages are grown in the United States, it is a European insect

and came into New York State about 1868 or 1870. The parent butterfly has two pairs of large, strong, white wings. Each of the front wings has a black patch in the outer corner and one or two black dots near the outer edge (Fig. 397).

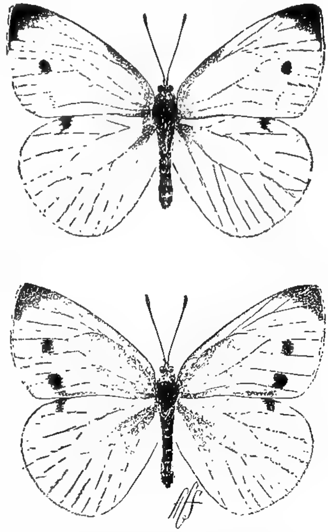

Fig. 397.— The Imported Cabbage Butterfly; Male Above, Female Below

The butterflies appear early in the spring, and the mother insect soon begins to deposit her whitish or pale yellow eggs on the leaves of the cabbage, one in a place. These hatch in about five days, and the tiny green worms appear. The velvety green caterpillars become full grown in about two weeks and each one transforms to a pupa which, owing to its peculiar appearance and silvery markings is called a chrysalis. The insect remains in the chrysalis stage from one to two weeks when the butterfly appears, thus completing the life cycle (Fig. 398). There are at least three broods in New York. It hibernates as a chrysalis.

Control. The caterpillars riddle the outer leaves of the plant and crawl down into the head, where they injure and soil the tender white leaves.

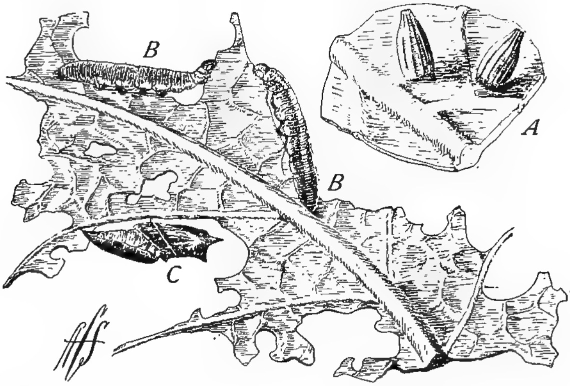

Fig. 398.— Parts of Cabbage Leaf, With Eggs at A, Caterpillars at B, and Chrysalis at C

This cabbage pest is best controlled by spraying the cabbages with arsenate of lead, 3 pounds to 50 gallons of water, or with

paris green 1 pound to 150 gallons of water. If the paris green is sifted on dry it should be mixed with 20 to 25 pounds of flour or fine air-slaked lime.

There is no danger in spraying cabbages with a poison up to the time when they are half-grown or even later. The outside leaves do not fold up about the head, hence there is little danger of enclosing the poison within the cabbage.

CUTWORMS

The well-known cutworms are larvæ or caterpillars of certain night-flying moths. There are several species of these cutworms and they attack various kinds of plants and cause a great amount of injury. They have the habit of working mostly at night and remaining hidden an inch or so below the surface of the soil during the day.

As an example of the life history of one of these pests we may take the one known as the yellow-headed cutworm. The parent moth of this cutworm usually appears through July and August and deposits its eggs at the bases of grass stems. Here they hatch and the cutworms live on the roots of the grass, attaining part of their growth by fall. They then go downward four or five inches and make cells in the soil in which they pass the winter. In the spring they return to the surface, eat voraciously, and complete their growth when they transform to pupæ in the soil, from which the moths emerge in July and August, thus completing the life cycle. The life histories of other cutworms may vary from this one but many of them agree in eating voraciously and growing fast in the spring, doing most of their damage at that time.

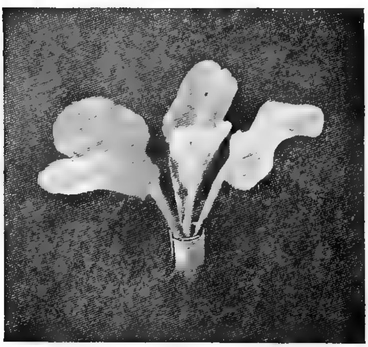

FIG. 399.— CABBAGE PLANT WRAPPED WITH STIFF PAPER AS A PROTECTION AGAINST CUTWORMS

Control. In the home garden cutworms may be caught and killed by hand. They will hide underneath pieces of boards or shingles placed near the plants where they may be found and destroyed.

They may be quite effectually destroyed with a poison bait made of 10 pounds of bran and 1 pound of white arsenic or paris green moistened with just enough water to hold the materials together, after which a quart or two of cheap molasses should be added to sweeten the mixture. A handful of this bait should be placed near each cabbage plant in the evening so that the cutworms will be attracted to it during the night after they emerge from their hiding places.

SQUASH BUG

The squash bug (*Anasa tristis*) is blackish-brown in color on top and specked with yellow underneath. It is from one-half to nearly three-fourths of an inch long and has two long antennæ on the head (Fig. 400-a). On the underside of the head is a long slender beak which constitutes the mouth parts, and with which it sucks up the juices of the plants on which it feeds.

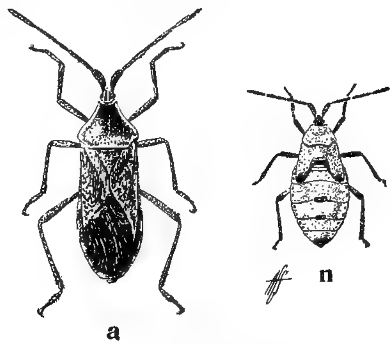

FIG. 400.— THE SQUASH BUG: (a) ADULT; (n) NYMPH

The full-grown bugs hide away in the fall beneath stones, boards, leaves and other rubbish that they may find. In spring they come from their hiding places and begin their search for squash vines. When they find the plants they soon commence to lay their brown eggs on the undersides of the leaves, and sometimes on the upper sides also. Occasionally the eggs are laid in regular rows, as shown in the illustration (Fig. 401). In eight to twelve days small green and black bugs hatch from the eggs. These young bugs are somewhat like the full-grown ones, but they have no wings and are lighter green in color (Fig. 400-n). They are called nymphs and each one has a beak with which it punctures the leaf and

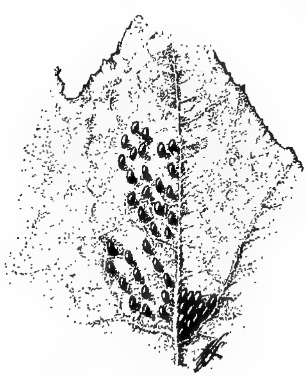
FIG. 401.— EGGS OF A SQUASH BUG ON A LEAF

sucks out the juices. The nymphs grow and shed their skins five times before they become adults. More than a month is usually required for the bug to reach full size. There is only one generation a year.

Control. The full-grown squash bug and the nymphs puncture the leaves of the squash and suck out the juices, thus causing the leaves and finally the whole plant to wither and die. In addition, the bugs may carry from one plant to another a very serious bacterial disease, the wilt, which sometimes causes a great deal of injury.

Poisons will not kill the bugs, but early in the spring one should keep a sharp lookout for the old bugs and catch them by hand before they lay their eggs. A little later the eggs, when laid, may also be destroyed. The old overwintering bugs may be trapped under pieces of boards, bark or shingles laid on the ground. The bugs will crawl under these for shelter and may be caught and killed in the early cool spring mornings when they are not very active.

STRIPED CUCUMBER BEETLE

The striped cucumber beetle (*Diabrotica vittata*) is only about two-fifths of an inch in length. The ground color is yellow above but the head is black, and there are three black lines running lengthwise of the back. The underside of the body is mostly black (Fig. 402).

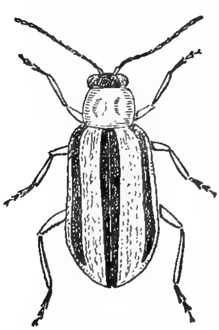

FIG. 402.— STRIPED CUCUMBER BEETLE, ENLARGED

The full-grown beetles spend the winter hidden away beneath leaves and other rubbish, but they appear early in spring and feed on such plants as they can find until the cucumbers and melons are up. After feeding for awhile on their favorite plants they lay eggs in crevices of the soil near the roots of the vines. The eggs hatch into slender, white, worm-like larvæ that live on the roots of the plants and cause more or less injury. In about one month the larvæ change to pupæ and in about one week more the adult beetles appear. In most parts of New York State there are probably two generations a season, while on Long Island there may be three.

Control. In spring the hungry beetles eat the leaves and flowers of the young plants of cucumbers, melons and squashes, and cause severe injury, sometimes destroying the plants.

The plants, at least in home gardens, may be protected by putting boxes, which have been made without tops or bottoms, around them. The lower edges of these bottomless boxes should be pressed into the earth so that the beetles cannot crawl under. The tops of the boxes may be covered with coarse thin muslin, at least until the second or third pairs of leaves appear on the plants.

Another protective measure is to keep the leaves of the plants covered with fine sifted ashes or air-slaked lime. The beetles seem to be repelled by the dust.

Probably the most effective protection against these beetles is afforded by spraying the plants thoroughly with arsenate of lead, 2½ pounds to 50 gallons of water, or in smaller quantities at the rate of 4 ounces to 5 gallons of water. Whatever is done must be done thoroughly and often. The new leaves as they appear should be covered with the repellant mixture.

COMMON ASPARAGUS BEETLE

Asparagus, introduced into the colonies with the early settlers from Europe, is said to have had no insect enemies for nearly two hundred years. Now, however, it is sometimes seriously injured by two beetles and a species of fly.

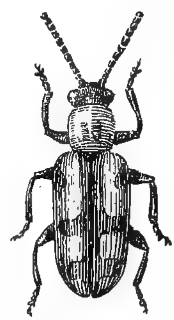

FIG. 403.—COMMON ASPARAGUS BEETLE

The most serious pest is the common asparagus beetle (*Crioceris asparagi*). The beetle is scarcely one-fourth inch in length, is blue-black in color, with a red thorax, and with lemon-yellow and dark-blue wing covers with a reddish border (Fig. 403). The adults vary considerably in general color, some being darker, while others are lighter. The beetles pass the winter under piles of rubbish, sticks or stones and appear in the early spring about as the asparagus is ready to cut for market. The adults deposit their rather large conspicuous dark-brown eggs on the stems of the aspar-

agus, often in great numbers. In a few days they hatch and the grubs begin at once to feed on the tender plants. In ten to fourteen days the grubs complete their growth and go down into the earth where they change to pupæ in dirt-covered cocoons. In about one week the beetles emerge, thus completing the life history. Two and perhaps three broods appear in a season in New York State.

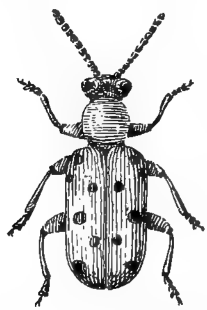
FIG. 404.—SPOTTED ASPARAGUS BEETLE

The other asparagus beetle is known as the twelve-spotted species and does not seem to be as destructive as the former. The chief damage by this species is done by the over-wintering beetles feeding in early spring on the young and edible asparagus shoots. The beetles and grubs that appear later seem to feed entirely on the berries of the asparagus plant.

Control. On small beds of asparagus the beetles may be hand-picked. Destroy all volunteer plants about the beds in order to force the beetles to lay their eggs on the shoots that are being cut daily and sent to market. Spray the asparagus plants after the cutting season is over with arsenate of lead, 2½ pounds to 50 gallons of water. In order to make the poison stick to the tiny branches of the asparagus it would be well to dissolve 2 or 3 pounds of hard soap in the mixture.

POTATO FLEA BEETLE

The potato flea beetle (*Epitrix cucumeris*) is a small insect about one-twelfth of an inch long with a black body and dull yellow legs. Its hind legs which are unusually stout enable this small bettle to jump suddenly when disturbed, like a flea; hence the name "flea beetle." It attacks tomatoes, egg plants, turnips and radishes as well as potatoes.

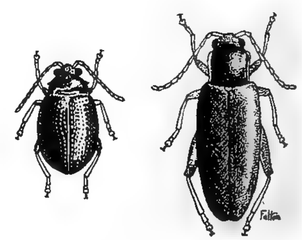
a b

FIG. 405.—TWO COMMON POTATO FLEA BEETLES. *Epitrix Cucumeris* (a) *and Systena Hudsonias* (b)

The adult beetles pass the winter hidden beneath rubbish or under leaves, and appear during

April and May. They may be found upon various plants at this early season, but later they attack the potatoes and injure the leaves by eating cavities in the epidermis on both the upper and under sides. In June or July they lay their white eggs in the soil and the larvae, which are white,

Fig. 406.— Potato Stalk With Beetle at Work: (a) Beetle; (b) Grub, or Slug; (c) Eggs

slender, worm-like creatures, seem to live upon the fragments of the seed potatoes and later upon the forming tubers. In some seasons on Long Island, at least, the larvæ bore into the potatoes, thereby causing "slivers" to form in the tubers. Moreover, spots or pimples may form on the surface of the tubers where the larvæ

entered. Such potatoes are said to be "pimply," and buyers take them only at a reduced price. There is apparently one brood, with possibly a partial second in New York.

Control. The principal damage is done by the small flea beetles themselves eating holes in the leaves. This injury is often very serious and hard to prevent.

Although these insects are biting, poisons do not seem to effectively control them. The best method of fighting them is to keep the leaves of the potatoes covered with bordeaux mixture. This mixture should be sprayed on both sides of the leaves as much as possible and it should be applied at frequent intervals at the rate of, at least, 100 gallons per acre. If the Colorado potato beetle is present, paris green may be added at the rate of 1 pound to 100 gallons.

IRRIGATING VEGETABLES IN NEW YORK

Paul Work

Superintendent and Instructor, Department of Vegetable Gardening, Cornell University, Ithaca, N. Y.

PRACTICABILITY

The casual observer in passing through the market gardening sections in the neighborhood of our cities cannot fail to notice lines of pipe supported on posts extending through many of the fields. Unless he happens along at just the right time he will wonder as to the uses of these lines. If he stops to inquire he will learn that each bears tiny nozzles spaced three or four feet apart, and that each is connected at the end with a water supply main. A conversation with the owner of the place will perhaps lead to a demonstration of the apparatus and he will see that these miniature nozzels are capable of applying water to a belt of twenty-five or thirty feet on each side, and that by means of a specially constructed union the whole line can be turned to cast water to cover ground at a considerable distance, in the intermediate space, or directly under the line, the latter being accomplished by means of a vertical throw. The flow is controlled by means of an ordinary globe or gate valve.

WATER SUPPLY

The next question which naturally arises in the mind of the observer is that of the water supply. There are few places where water cannot be had under conditions which would make its use profitable. In some instances a small pumping plant is established by the side of a stream or pond. A three-horsepower engine and a duplex pump is able to furnish 100 gallons of water per minute at a pressure of 30 pounds and at a cost of about ten cents per hour. As different areas can be watered successively, this is sufficient to take care of several acres. Other gardeners sink wells to a deep water-bearing stratum lying below. Some use a number of driven wells connected together. Others use single wells of large diameter which have a great gathering surface.

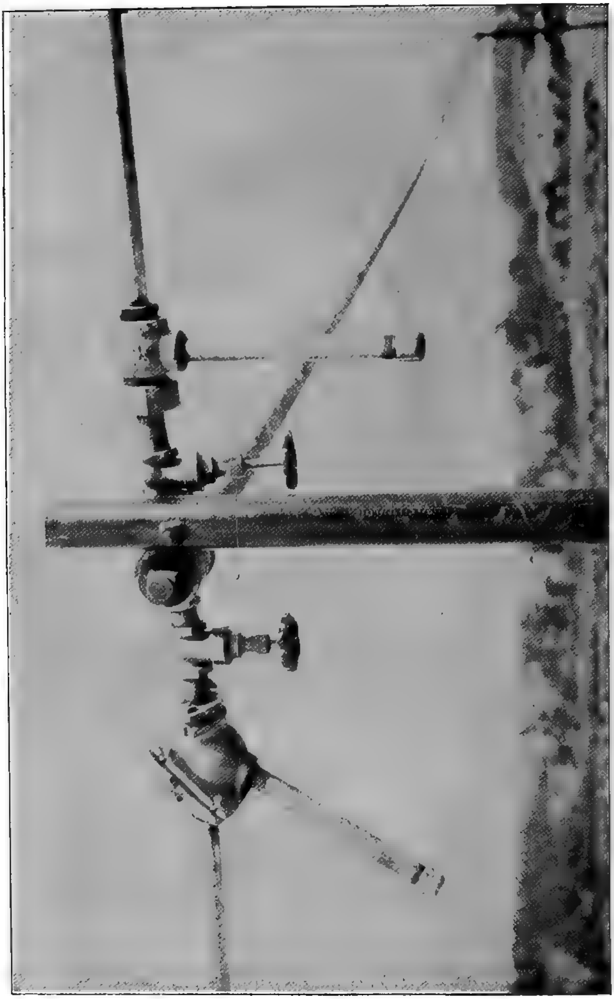

FIG. 407.— WHERE THE NOZZLE LINES JOIN THE MAIN. TWO TYPES OF UNION

At Rochester a most ingenious method is employed. A concrete ring perhaps eighteen feet in diameter, four feet high and a foot thick is constructed with a sharp lower edge. This is strongly reinforced. The soil is then dug out from the inside and it is allowed to sink as the work progresses. Concrete block are built upon the ring and thus the wall of the well is constructed as it gradually drops into its final place. Radial pipes are usually set in the concrete ring to permit the free inflow of water. If a stream can be dammed at an elevation of about one hundred feet above the gardens the gravity will supply sufficient pressure, a three and one-half inch pipe delivering approximately 100 gallons per minute at a distance of from five to seven hundred feet. An increasing number of gardeners are able to secure city water at such reasonable prices as to make this the best available supply. They take advantage of the rates which are accorded manufacturers who use relatively large quantities.

OVERHEAD IRRIGATION

The management of overhead irrigation apparatus presents some interesting questions. But little real experimental work has been directed along this line and the knowledge of the subject is based almost entirely on experience and opinions of growers. Most users believe that thorough irrigation less frequently is to be preferred to many light applications. Most men water at night or when it is cloudy, but some do not hesitate to use it even in mid-day, believing that the plants are benefitted by the cooling. The work should be so planned that the ground will not be muddy when produce is to be gathered from the field. Precautions must be taken against cracking with such crops as tomatoes and roots. This is usually occasioned by heavy watering after the plants have been kept quite dry. Care should be taken to avoid the development of rots of various sorts, in lettuce especially, as it nears maturity.

DOES IRRIGATION PAY?

We have thus far neglected entirely the important question, does irrigation pay? The very rapid increase in the number of users of irrigation is quite conclusive evidence in its favor. Those who have had experience find it especially helpful when they sow

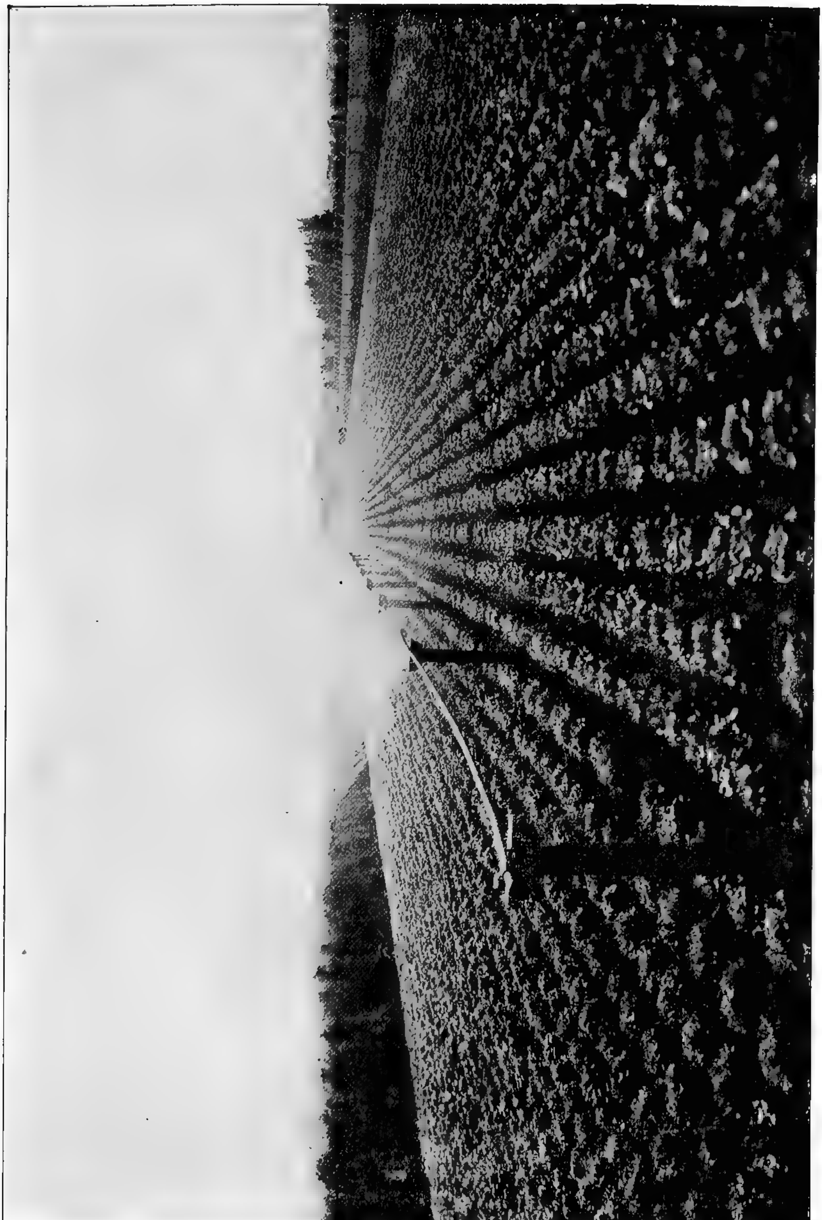

FIG. 408.— OVERHEAD IRRIGATION

seed in dry weather, when they transplant plants and as crops near maturity. It always pays to have products to market when the other fellow has none, and judicious application of water will very frequently enable a man to make his regular sales while his neighbors are devoting most of their time to praying for rain. Prices are usually highly favorable at such times.

Viewing the case from another standpoint, we are further convinced of the value of irrigation. The vegetable man invests in land, in labor, in fertilizing material, and any other factors which make for heavy yields. It frequently happens that his return from these investments is jeopardized or lost through his inability to control the moisture factor. He may do much by leaving his land rough through winter to prevent run-off, by harrowing frequently until planting time, by maintaining an effective mulch throughout the season — but even so, through sheer absence of moisture to be conserved, his whole crop may be lost, or so much of it that he might better have left the ground unplanted.

On the other hand, irrigation is not a panacea. It does not relieve the grower of the necessity of good drainage and careful cultivation. The former is a precaution against over-watering by means of his artificial system or by means of heavy rains which may come just after a thorough irrigation. The latter saves water which is costly and helps to keep the soil in better physical condition. The man who invests his money in the improvement of most of the growth factors and then invests more money in irrigation, but who neglects a single additional factor which limits the crop return, is worse off than if he had never heard of irrigation. He loses the cost of irrigation in addition to other costs.

Many growers can give very inspiring figures as to the results they have obtained by means of irrigation. A New Jersey producer has secured yields of as much as six hundred and twenty bushels of potatoes from an acre. The same planter was able to mature a $1,500 crop of onions from a five-acre field in time to permit the setting of a later crop of celery. Another grower reports that an outlay of three or four hundred dollars saved several thousand dollars worth of celery, whereas an unwatered acre and a half was a complete failure. The Ontario Agricultural College reports experiments with lettuce as follows:

Treatment	Maturity Leaf	Maturity Head	Weight of Crop Leaf	Weight of Crop Head	Quality
Irrigated	June 22	July 10	20 lbs. 5 oz.	25 lbs. 15 oz.	Fine
Non-irrigated	July 4	July 26	20 lbs. 3 oz.	9 lbs. 1 oz.	Bitter

The cost of installing irrigation equipment on an acre of ground usually lies between \$100 and \$150, according to the price of pipe and a man's ability to pick up bargains and to utilize material that is lying around. These figures do not include the water supply, which is, of course, very difficult to estimate on account of the wide variation in conditions.

IRRIGATION BY UNDERGROUND PIPES

Other methods of irrigation are practiced in various sections of the country. About Boston a system of underground pipes is frequently installed which, with fifty feet of hose, will reach all parts of the garden. It costs about \$65 to equip the first acre and roughly \$50 per acre thereafter. An inch of water (27,152 gals.) may be applied to an acre of ground with an inch and a quarter hose by a single man in five or six hours. This method is not very generally favored on account of the labor and the cost of maintaining hose, and on account of the distribution of plants and danger of injuring the physical condition of the soil.

SUB-IRRIGATION

Where the sub-soil is impervious, or where, as in the case of the muck lands, a high outlet maintains the water table relatively near the surface, it is possible to water by sub-irrigation. On the muck lands this is accomplished by merely blocking the outlet in such a way as to bring the water up a little nearer to the surface. The soil is well saturated, the outlet is again opened and the surplus water allowed to drain off. Of course, this will not work unless there is a small stream flowing into the swamp, though such is frequently the case. At Sanford, Florida, sub-irrigation is practiced by means of a system of ditching almost like that used for drainage. In fact, the same lines may be used for both irrigation and drainage. In this district the water supply is from artesian wells. Surface irrigation is utilized to some extent in the East.

The method consists of conducting water along the end of the plot to be irrigated and allowing it to flow into furrows between the rows of the crop. It is best to permit the water to reach the far end of the row as soon as possible and then allow it to be absorbed evenly throughout the land. If this is not done the part of the field next the supply ditch will receive much more water than the remainder. This form of irrigation is useful on level land where there is abundance of water and where the soil is suitable. Light soils drink up the moisture so rapidly that even distribution is difficult.

MARKETING VEGETABLES

C. R. White, Ionia, Ontario County, N. Y.
Farmers' Institute Lecturer

The question of marketing vegetables presents several phases for consideration, for the reason that there are so many conditions under which the production is carried on.

THE HOME MARKET

The problem of the one who lives in close proximity to the town or city in which the product is to be sold, who knows either the wholesaler, the retailer or the consumer to whom he is to sell, and is familiar with the requirements of the market, is much different from that of the large commercial grower, who depends on the markets of the entire country and who does not know at the time of planting whether the demand for his product will come from New York, Boston, Pittsburgh, Cincinnati, Chicago, or possibly be transported over still longer distances to the far southern markets.

The former knows just what his market requires as to type, color or condition of each vegetable. He knows the whims and caprices. He is able to establish a regular trade or to bring his products forth from day to day as the demand requires. He knows where the fancy products will meet with a ready demand, and where the cheaper trade is to be found — to whom he can dispose of his poorer grades. Only when there is a great over-supply is he in trouble.

THE DISTANT MARKET

Not so with the man who is dependent on shipments being made over a wide area. He has a dozen different markets, each with its own peculiar requirements and demands. He has a chance of selling to a local dealer who has no particular interest in either the product or the producer, except to get his margin; or, on the

other hand, he can consign to a commission merchant in a distant market, running the many risks which are to be encountered — delay in getting cars; poor refrigeration and consequent loss in hot weather; or freezing if in cold weather; delay in transit and consequent loss; rapid market fluctuation and consequent falling in price during the time the product is in transit, and finally, the dishonesty of the receiver.

A large number of the individual growers prefer to take less and sell to the dealer, letting him assume the risks, which is the better way where there is only a limited number of shipments to be

FIG. 409.— A WELL-FINISHED AND A POORLY-FINISHED TOMATO PACKAGE

made, for there are always losses, and, unless the shipments are large enough — as in the case of the dealer or large grower who can distribute his losses over a large number of shipments — it is liable to strike rather hard if the loss is very heavy.

PUTTING OUT A SATISFACTORY ARTICLE

There are a few essentials which should always be taken into consideration in any event. First, that products should always be grown, harvested, graded and packed with a view to satisfying the purchaser. It is comparatively easy to get the purchase

money for a product which meets with his approval, but it is difficult to convince him that the article is worth more to him than his cash, unless it is satisfactory. Second, that the product should be harvested at the right time to carry to its destination in good condition. Third, it should be packed in the package which meets with the approval of the particular market to which it is to be shipped.

It should be packed attractively, but never so as to deceive or defraud the buyer. It is better to have the contents of a package prove better than the face rather than poorer. Then it will win reputation and consequently customers. And, understand, the time is ripe for community or collective selling of crops.

The manufacturer who has most nearly reached the acme of perfection is he who has specialized in his business. He gives special attention to so producing that he will have the highest quality of product at the minimum cost. The man who accomplishes that gives no heed to the disposition of the product except to learn the public demand so he can meet it.

ADVANTAGE OF COOPERATIVE SELLING

On the other hand, the product is sold by men who are equally as expert in salesmanship, thoroughly acquainted with the demand of every market, with transportation conditions, with the trend of prices in the past, and alert to every phase of the science of distribution of his particular commodity.

It will be said that the vegetable grower is not large enough, individually, to carry on this kind of business, except when he is close to a special market; but collectively he can accomplish the desired results.

The public packing house where the products can be graded to well established standards; a system of pooling whereby the occasional loss which is sure to occur to every shipper can be distributed over a larger volume of business, thereby becoming only an incident; and finally the employing of special expert salesmen, will place the grower in a much more advantageous position.

It may be said that this cannot be accomplished except when vegetable growing is done on a large scale, but the tendency where such association work is carried on is to bring about specialization.

The requisites for success along this line are: recognition of the possibilities of the undertaking; absolute honesty of both individuals and association, and absolute loyalty and determination to make the undertaking a success.

VEGETABLE GARDENING AT CORNELL

Paul Work

Superintendent and Instructor, Department of Vegetable Gardening, Cornell University, Ithaca, N. Y.

For many years courses in vegetable gardening have been offered at the New York State College of Agriculture at Cornell University at Ithaca. It is only within the last few years that this field has been developed as a specialized branch of agriculture. In October, 1913, the work was commenced as a separate department and the staff now includes four men who are engaged in teaching and one in extension work, beside the gardeners and the office force.

It is the aim of the department to serve the vegetable interests of the state and of the country as far as possible. The prime need at present is for men well trained in practical experience, as

Fig. 410.— Students' Garden Work at Cornell

well as in technical knowledge, to carry forward the innumerable tasks which lie before us — the solution of the important problems of the field, the building up by well-planned research of a body of fundamental knowledge of matters pertaining to vegetable gardening, and the dissemination of the best that is known through extension teaching, through winter courses, and through courses for regular students. The work at Cornell is being developed in all of these lines. One member of the department gives

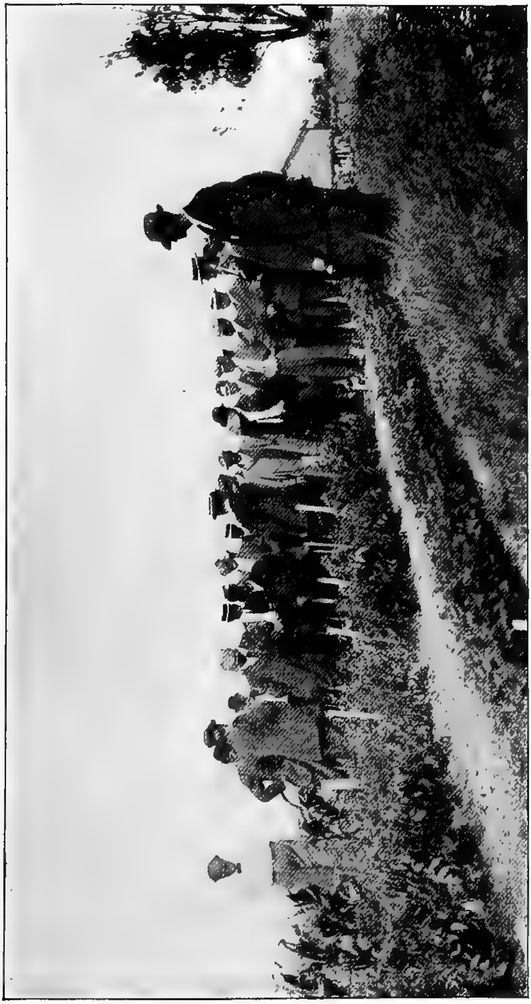

FIG. 411.—SYRACUSE GROWERS VISIT CORNELL GARDENS AT ITHACA, SUMMER OF 1914

his entire time to extension work, attending meetings and extension schools, advising with growers and conducting demonstration trials.

The research side of the department activities, though vitally important, is as yet in an early stage of development. On account of the fact that Ithaca is not in a vegetable producing section and the near-by soil is not typical of that existing in such districts, much of this work will have to be conducted at a distance from the College. It is expected that a man will shortly be appointed to the staff to give his whole time to such studies.

The teaching at the College is planned for regular all-year students, for short winter-course students and for students of the six-weeks' summer school. Most of the courses for regulars are arranged for persons interested in commercial production. The plan for students who wish to specialize in vegetable gardening represents a radical departure from the conventional scheme of winter instruction and summer vacations. It is shaped rather in conformity to the seasons of crop growing. The summer of the first year is spent on a general or a specialized farm according to whether a student has previously had field experience. The spring and summer of the second year is spent with a commercial grower of vegetables. The spring and summer of the third year is devoted to elementary vegetable courses and the fourth season to advanced courses. Thus, in the laboratory work, crops are carried from seed to maturity under the direct daily attention of the students. The vegetable courses include a brief introduction to the subject, a general commercial course, a course in vegetable forcing (producing crops under glass), and a course in the botany types and varieties of vegetables. Ample time is allowed for courses in fundamental science, in associated subjects, such as plant pathology and insect pests, plant breeding, farm management, and others. The student is expected to take such courses in other departments as will give him a broad, general knowledge of agriculture as a whole rather than a narrowly specialized training in a single branch.

Briefer courses are also provided for the student who does not contemplate specializing in vegetable gardening, and for those who are interested only from the standpoint of the home garden.

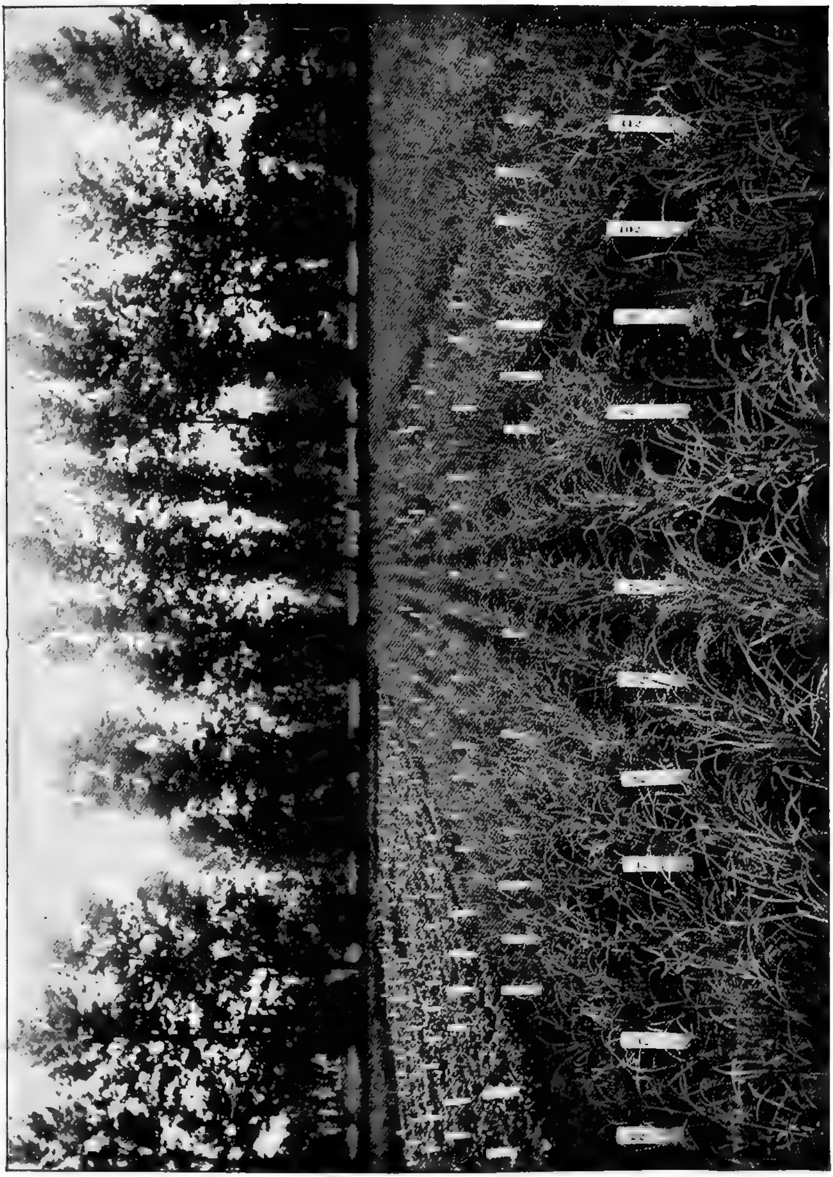

FIG. 412.—A CORNELL COOPERATIVE TEST OF ONION VARIETIES AT CANASTOTA

The winter course in vegetable gardening has been arranged especially for those who are interested in this kind of agriculture and who are unable to spend the whole year at Ithaca. It is attended by increasing numbers of actual commercial growers as well as persons who expect to enter this field for the first time. The presence in the classes of young men who hail from the various producing sections of the state has added greatly to the interest and value of the work. The plan calls for courses in commercial vegetable production, in vegetable forcing, in soils, in fertility of the land, and in one or two other elective subjects. It is recommended that those who might possibly spend two winters at Ithaca devote the first to a course in general agriculture, and specialize in vegetable gardening the second year.

The department is gradually building up a splendid equipment for the work in vegetable gardening. Its offices and class rooms are located in the poultry building. Here are kept the collections of preserved specimens, of herbarium material, of photographs and lantern slides, as well as of books, bulletins and periodicals. Four glass houses, comprising about 6,000 square feet of space, constitute the vegetable range at present. This is to be enlarged to about double the area. Adjoining the greenhouses is a frame yard which accommodates at present about 125 sash. The glass is used for laboratory and departmental work in plant growing and for growing plant crops to maturity.

The gardens include 3½ acres of sandy soil and about 12 acres of heavier land. The former is well adapted for intensive work and is equipped with service building and with irrigation apparatus, illustrating several types. This garden provides facilities for the individual student's field work. A half an acre is planted each year with samples of the leading varieties of all the vegetables. The 12-acre piece is divided for a four-year rotation and is utilized for the less intensive types of gardening which are practiced by the general farmer. The products of the gardens are harvested and sold, thus giving opportunity for laboratory work in marketing.

THE NEW YORK STATE VEGETABLE GROWERS' ASSOCIATION AND ITS WORK

Paul Work

Superintendent and Instructor, Department of Vegetable Gardening, Cornell University, Ithaca, N. Y.

Over four years ago a small circle of New York vegetable men were gathered in conversation in the lobby of the Hotel Secor in Toledo. These men had journeyed from the Empire State to attend the meeting of the Vegetable Growers' Association of America. Within the circle the question arose as to why New York State should not itself have meetings organized on as high a plane as those of the national association. The idea was favorably commented upon and as a result a questionaire was addressed to a number of the commercial producers of the state inquiring as to whether they would be willing to support a state association. Replies were favorable and a call was issued for a meeting to consider the matter of organization. During Farmers' Week of 1911 it was decided to establish such a society and twenty-seven men became members at that time. About as many more men who were unable to be present at Ithaca joined the association within the first few months. From that day to this the growth has been steady, amounting to about 25 per cent. per year. The early months of 1915 point to a much more rapid increase in the enrollment, and the association seems now to be firmly on its feet.

Two features of the development in membership have been particularly encouraging. From the first the membership has included leading growers from every corner of the state, and at present hardly an important producing center is unrepresented. Even more important than this has been the marked development in interest on the part of members. A large number of men are willing to give time, thought and energy to the activities of the organization, and a spirit of solidarity and of willingness to cooperate is developing in a marked degree.

The association began with comparatively few and simple activities. Each year has witnessed the introduction of some new

FIG. 413.— GROUP OF DELEGATES WHO ATTENDED MEETING OF NEW YORK STATE VEGETABLE GROWERS' ASSOCIATION, BUFFALO, N. Y., JANUARY 14, 1915

line of work of prime importance. The work of 1911 was the establishment of the society. In 1912 the seed service was inaugurated. This has developed until it seems necessary that it be reorganized for 1916 in such a way as to take care of the increased business, as well as to include many varieties which are not now listed. In 1913 the first annual report was printed. This records the proceedings of the meetings and so carries the good work of the sessions to members who are not able to be present. The value of this report is indicated by the large number of calls for copies which have been received from institutions and individuals outside of the state. The volume is of nearly three hundred pages and includes a full list of vegetable bulletins of all the experiment stations which are now in print. The association helps members to procure these bulletins which would not otherwise be available to New Yorkers.

FIG. 414.— PACKAGE EXHIBITS OF NEW YORK STATE VEGETABLE GROWERS' ASSOCIATION AT STATE FAIR, 1912

It has long been the idea of the officers of the association that the meetings of the association should be carried into the local producing centers. In other words, that it is cheaper and easier to carry the speaker to the people than to carry the people to the speaker. Accordingly one day meetings have been held in

Buffalo, Angola and Syracuse. It is probable that many others will be held next year. This was the contribution of 1914.

The prime work for 1915, which is now under way, is the establishment of a crop report service for the benefit of members. Sheets are sent out to all members and these are filled out and sent in to headquarters. This work is under the able and energetic leadership of Professor W. B. Nissley of the Long Island School of Agriculture at Farmingdale.

FIG. 415.— EXHIBIT OF NEW YORK STATE VEGETABLE GROWERS' ASSOCIATION, STATE FAIR, 1913

The Association is also engaged in active work looking toward favorable legislation, better transportation conditions, more and stronger local organizations of vegetable men, better service for growers from colleges, experiment stations and other institutions, and seeking recognition for the interests of the grower in the reorganization of the marketing system which is now in progress. Through the influence of the association very marked improvement has been brought about in the conditions governing the exhibiting of vegetables at the State Fair. The value of the premium list has been doubled, and it is expected that very much better quarters will be available for these displays in the coming year.

The New York State Vegetable Growers' Association was not formed with the idea that it should become a great business enterprise, but rather that its work should be educational and supervisory. It is the aim of the association to do all in its power to further the interests of the vegetable men of the state by disseminating information and by exercising its influence in the interest of progress.

The officers of the association are: President, Henry Greffrath, South Lima; vice-president, S. J. Cook, Dunkirk; secretary, Paul Work, Ithaca; treasurer, C. H. Aldrich, Mattituck.

VEGETABLE GROWERS' ASSOCIATIONS IN NEW YORK STATE

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EXHIBITION OF VEGETABLES

PAUL WORK

Superintendent and Instructor, Department of Vegetable Gardening, Cornell University, Ithaca, N. Y.

The horse and stock industries have in the past found that exhibitions and exhibiting have accomplished great things for the advancement of the breeds with which they were working. The same statement might be made regarding both fruits and flowers, and furthermore regarding vegetables in European countries, particularly in England. The question at once arises — in what way is exhibition worth while for the individual grower? The chief advantage is undoubtedly in its educational value and in the inspiration toward better effort. One cares to show nothing short of his best. His first problem in preparing an exhibit is, what is the best? In deciding this, he establishes clearly in his own mind an ideal toward which his effort for the whole crop will turn. The second question is: can I not improve my entire crop in the direction of the standard which I am selecting for the fair? Thus his attention is focused upon his cultural methods, upon his seed and his soil, and his market requirements. Thought always means progress. Question three arises when the other fellow gets the prize. What is lacking on my place that I can not do as well? More thought and study is the result, and again, inevitably, progress. The comparison of types on the show bench is also most useful.

Both producing districts and individuals have found that exhibition is profitable advertising. Of course, a " First " is always of intrinsic value, whether for sewing machines, ginger ale, Holstein cattle or garden products. The garden people have not thus far taken full advantage of the possibilities.

Exhibits mean much to the vegetable business as a whole, for the progress of all vegetable growers means progress for each. Slow but steady advance is made toward standardizing types and varieties, in letting the best be known and in raising the ideal of the average grower.

Vegetable exhibits help to educate the public as to the value of vegetable food, as to the variety that is available, and as to the quality which they should demand.

The opportunities which are offered at the State Fair and in the various county fairs ought to be accepted, and where proper facilities are not afforded — as is now emphatically the case at Syracuse — united efforts should be exerted toward bringing about more favorable conditions.

POTATOES *

Edward van Alstyne, Kinderhook, N. Y.
Director of Farmers' Institutes

No one can lay down a set of rules which another may follow to the letter, and thereby insure a crop of potatoes or of anything else, for there is always to be taken into account differences in soils, as well as climatic and weather conditions, which prevent any hard and fast adherence to another's methods. Nevertheless, there are with the potato crop, as with every other, certain fixed laws which always obtain, and he who works in harmony with them, rather than from custom or tradition, works with nature, and is more likely to succeed.

Therefore, in calling attention to some of the principal laws which govern the potato — laws which are the same everywhere — I aim rather to help someone to secure a crop with a greater degree of certainty, than to give methods, which apart from the underlying principle may be of little value.

First, then, let us look at the construction of the tuber. It is made up, in round numbers, of 75 per cent. water and 25 per cent. starch. The water — without which in sufficient quantities, and at the right time, it is impossible to obtain a maximum crop — must, of course, come from the soil. The starch is formed by the action of the sunlight through the green leaf. Whatever, then, tends to promote a vigorous growth, and maintain and preserve the leaf surface at its best throughout the entire period of the plant's life, will insure the development of the greatest amount of starch, without which no potato can attain full size or highest quality.

How shall we secure the requisite water supply? If we could control the rainfall, the problem would be an easy one. Unfortunately — or fortunately — in nine years out of ten there is not

* Revised from Report of Bureau of Farmers' Institutes, 1910. Write for *The Potato Industry in New York State*, Bulletin 57, Department of Agriculture.

enough rainfall during the growing season, from May to October, to produce a full crop of anything, much less a crop like the potato, which is three-quarters water. When one realizes that it requires at least 300 pounds of water to produce 1 pound of dry matter in a plant, and considers the tonnage from even a moderate crop of potatoes (75 per cent. water), and then compares this with the average rainfall in his locality during the above-mentioned period, he will appreciate the truth of this statement. We must, then, secure a water supply from that in the ground in early spring, derived from melting snows and spring rains, at a time when there is little evaporation from the soil; and conserve that from the precipitation during the growing season. This can be done in two ways:

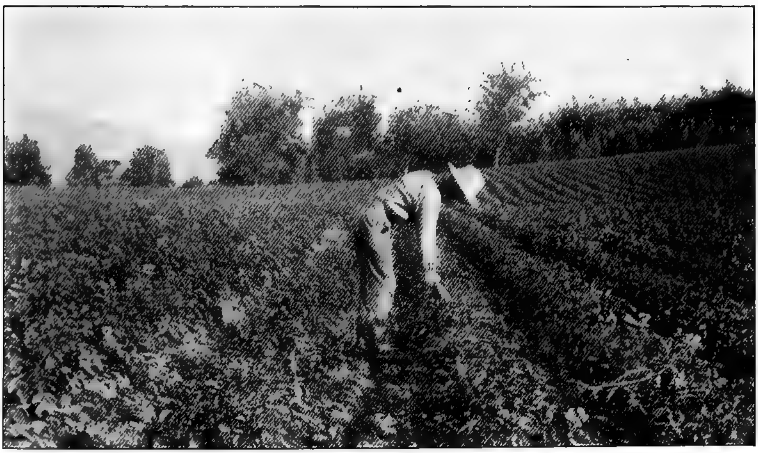


FIG. 416.— POTATO FIELD OF H. F. HORTON, STEPHENTOWN, RENSSELAER COUNTY, N. Y. FOLIAGE IN PERFECT CONDITION AS A RESULT OF INTELLIGENT FERTILIZATION AND CULTIVATION, FOLLOWED BY THOROUGH AND TIMELY SPRAYING FOR BUGS AND BLIGHT

1. By preventing evaporation by frequent stirring of the surface soil. As fast as the ground is plowed in the spring, it should be harrowed or rolled — not left until the whole field is turned over. This will make the soil compact, and prevent loss of water by drying winds, and by breaking up of the capillary cells which quickly form when the ground is crusted, thus making the spaces so large that the water cannot climb to the surface and escape. If the weather is very dry, it is better to roll as fast as plowed, and then

stir the surface. If the land has been fall plowed and one does not intend to replow, as soon as the land will bear a pair of horses and a light harrow, stir the surface. This will not only stop evaporation, but as the air strikes the soil the water will drop down, to be drawn up later when it is needed. Just as in a test tube, the water will not run out so long as one keeps his finger tightly over the top, but remove the fingers and let the air in, and at once the water falls. The same principle of frequent stirring during the cultivation of the crop, until the tops cover and shade the ground, will do more to conserve moisture and insure a crop in a dry season than any other one thing.

2. Plenty of vegetable matter in the soil will help to hold moisture. To illustrate: if we put an equal amount of water in two vessels, but place in one a sponge, and leave them both exposed to the sun and air, we know that from the one containing the sponge we can obtain water long after the other is dry. The vegetable matter has the same effect in the soil. I cannot, in the brief space at my disposal, describe and emphasize the question of soil humus as I should like to, but it is most vital to this crop. That is one reason that I prefer a clover sod for potatoes. I know many prefer "old ground." I am sure this is because the sod is turned in such a way as to leave the soil open, and the sod does not decay. If it is turned on edge with a narrow lap furrow and then compacted, it will decay very fast and be mixed with the soil where it will hold water. Better still, if the sod is thoroughly broken up with a cutaway before it is plowed, the vegetable matter will be incorporated in the soil, and at once decay and feed the plant, and less fitting will be required after plowing. It naturally follows, then, from the above that the ideal soil for potatoes is a loamy one, not so hard or compact that the water cannot readily move through it.

THE SEED

We are accustomed to speak of a "seed potato." Really, there is no such thing for a potato is a tuber, and whatever seed there may be is in the ball on top. When we plant a true seed of grain, for example, although it may come from a weak parent, the pollen from the stronger plants surrounding it overcomes, to a degree at least, the inherent weakness. Hence, such seed selected from the

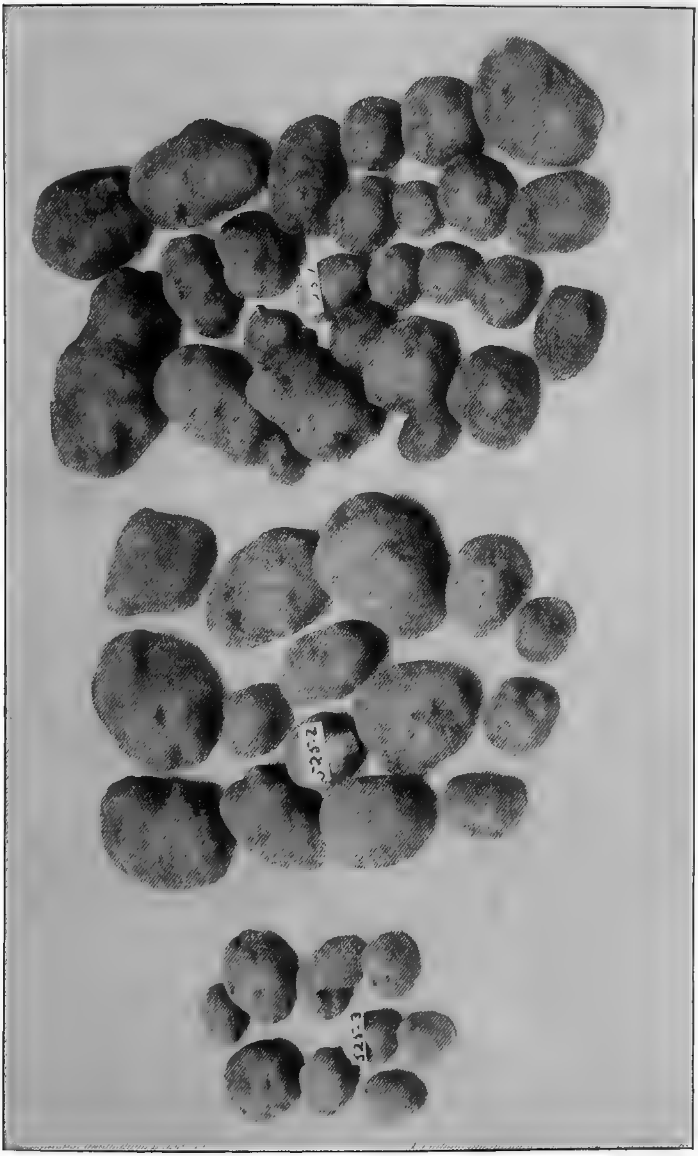


FIG. 417.—VARIATION IN THE PROGENY OF THREE INDIVIDUAL TUBERS OF VERMONT GOLD COIN. SERIES 525–1, IRREGULAR, GOOD YIELD; SERIES 525–2, REGULAR, GOOD YIELD; SERIES 525–3, LOW YIELD

pile by its appearance usually will not deteriorate, but will often improve on the same farm from year to year. Not so with the potato tuber or cutting. If one from a weak hill, with only one or two potatoes, or one in which all the tubers were small, is planted, there must be a deterioration, for there is no cross pollenization from a strong plant to help it. This explains why varieties of potatoes run out, and why people are continually seeking new, strong seed. There are thousands of dollars expended every year for potatoes to plant, many of which come from diseased stock, and few of which are selected, except by external appearance. Most of this money might be saved if the seed tubers were selected from the most vigorous productive hills; not so difficult a task as might at first glance appear, for one can plant a small portion of

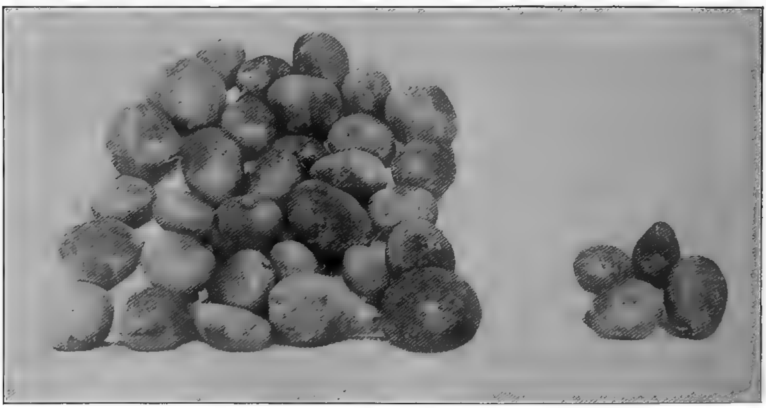


FIG. 418.— SHOWING VARIATION IN THE YIELDING CAPACITY OF TWO INDIVIDUAL TUBERS SELECTED FROM RURAL NEW YORKERS.

a field expressly for this purpose, and by digging the potatoes by hand can throw out all hills not coming up to the desired standard. I know two men, in widely separate parts of this state, who had a few years ago — and, for aught I know to the contrary, have now — the Early Rose as productive as when it was first introduced, and they have used only their own seed, potatoes being selected as above.

A small or medium-sized potato, if it comes from a vigorous productive hill, is a good seed, but the continued planting of small potatoes will mean deterioration, for an increasing number each year must come from hills in which the potatoes were all small.

Anything which impairs the vitality of the seed means less vigor and productivity of the plant. Hence, if the tubers were blighted the previous year, it is probable that the disease is carried directly to the new crop. Of this I shall speak in particular in treating of blight. Again, a field in which the tops were destroyed by blight is one in which, because of the destruction of the leaf, the normal amount of starch has not been formed, and we have an imperfectly developed tuber. If the seed is kept where the sprouts grow long and are broken off there is a loss of vitality. For this reason I prefer to store the seed tubers in pits in the earth so covered with straw that they will not freeze, yet where they keep much cooler than in the ordinary cellar. The same covering will also keep the heat out for a long time in the spring. If one is planting late, after danger from the frost is past, the potatoes can be taken out and spread on a floor where it is light and cool. The eyes will then start slowly, and any potatoes which fail to sprout or which send out a thread-like shoot may be rejected, thus saving vacant or worthless hills.

There is an increasing complaint of damage from scab. This is a bacterial disease, and never the work of insects. The infection may come from the soil. If so, there is no sure way of preventing the trouble. Professor Sirrine, of Riverhead, L. I., has had good results from 500 pounds of sulphur mixed with each ton of fertilizer — using a half ton of the fertilizer to the acre — applied in the drill. A sweet soil is most favorable to the growth of scab. For this reason lime should never be used on land just prior to a potato crop. Wood ashes which are rich in lime have the same effect. It will take at least three years for the scab to disappear from the soil, and in one badly infested, or strongly alkaline, much longer. I have found growers in the Ohio Valley using rye to be turned under before planting potatoes. This makes the land slightly acid and consequently less favorable for scab development.

A frequent source of infection is scabby seed, which can easily be controlled. The old remedy, and an excellent one, is to soak the seed — preferably before cutting — for at least an hour in a solution of 1 ounce of corrosive sublimate to 8 gallons of water, or 1 pint of formalin to 30 gallons of water. This will

treat as much seed as it will cover, and may be used again and again. A convenient way is to place the tubers in a sack and suspend it in a barrel or tub of water. After the requisite time of soaking it can be raised up, and the solution will drain back on the vessel, and the potatoes be dry to handle. Both of the above disinfectants are poison and should be handled with care. Where a large quantity of seed is to be treated, the above method takes a great deal of time.

Much advice has been given as to how small a piece of potato to plant. No one can lay down any ironclad rule, but the underlying principle must be taken into account. From the standpoint of economy, one cannot ordinarily afford to plant whole potatoes, and one too small to cut is too small to plant. The number of eyes in the seed piece depends on the type of potato, and the condition of the soil in which it is planted. Two strong eyes are enough, if they grow. The flesh about the eye sustains it until it can root and be sustained in the ground. A potato of the Early Rose type, with many eyes, will have less flesh about four or five eyes than one of the Rural type, with a few eyes, will have about one or two. Hence, the latter can be safely cut to a less number of eyes than the former. If the soil is moist and fertile, the roots will obtain a feeding place much sooner than if it is dry, hard and sterile. This, too, must determine the size and number of eyes.

DEPTH OF PLANTING

The potato requires coolness and moisture. If the planting is shallow it means, sooner or later, heat and dryness. Hence, rather deep planting, 4 or 5 inches, is to be recommended, because it is according to the law of the plant. No one ever saw the tubers form much below the seed piece. Planted shallow, they must of necessity form near the surface. To prevent drying and burning, they must then be ridged up with earth taken from between the rows, cutting off many feeding roots, and leaving a cone-shaped hill which sheds water, and a depression which carries the rainfall to the lowest part of the field, where it is least needed. When planted deep, the tubers have a chance to form in the more moist soil, little ridging is necessary, and

the summer rain penetrates to the roots about each plant. Those who plant early will contend that potatoes planted deep will be longer coming up, and the crop will not be as good as if they were planted more shallow and afterward ridged. This is true, yet the principle obtains. Early in the season the ground is cold and has an overabundance of water. If planted and covered deep, it will take a long time for the sun to penetrate to the tuber. Hence, they sometimes fail to come up at all, or are too late for the highest price. If, instead of covering deeply all at once, just enough of the warm surface earth is put on to keep them from chilling, the sun will warm and start the eyes. After a few days put on, with a harrow, a little more earth which has also become warm, and repeat the process until the ground is level, when the potatoes will come up quickly and be strong. At the same time one has cheaply stirred the ground, retaining the moisture, and destroying countless weeds just as they were sprouting.

Except in very foul ground, on which it will seldom pay to plant potatoes, the best yields are obtained from drill, rather than from check row planting. More hills can be put on an acre and there is less disturbance of the roots by late cultivation when this is done only one way.

FERTILIZERS

How much fertilizer and what kind to use, depends largely on the soil. If one has a clover sod, that will help to supply nitrogen, and the decaying vegetable matter will emit acids which help to liberate mineral plant food. In this case it will not be necessary to supply so much commercial fertilizer, particularly nitrogen. It is important to remember that nitrogen in organic matter, such as the decaying sod, manure, tankage, fish scrap or the like, will not become available until the ground is warm. Hence, for early potatoes, or where one depends in part on the sod, I would use nitrogen in the form of nitrate of soda. This is available at once, and for every 100 pounds of nitrogen applied, 63 pounds are found in the plant, while from organic sources, not more than 41 pounds in each 100 pounds applied. For this reason I believe it economy, when nitrogen

must be purchased for later growth, to use nitrate of soda, making a second application just before it is needed. If a large amount is applied at one time, early in the season, much may be lost through leaching before the plants can use it. The danger of such loss will be reduced in soil full of humus.

When manure is made on the farm and is applied to a sod in the late fall or early winter, so that it is broken up by the frost and rains, there is little damage from rot or disease which may occur with manure applied just before planting. This will usually supply all the nitrogen needed, and all that need be purchased is phosphoric acid and potash. I have had excellent results from 1,800 pounds of South Carolina rock and 200 pounds of muriate of potash. This will analyze about 12 per cent. of phosphoric acid and 5 per cent. of potash. We hear much of the need of a large amount of the last named for potatoes, and many potato fertilizers contain as high as 12 per cent. For muck soils and those deficient in minerals this is doubtless none too much, but for most New York soils which are high in potash, all the evidence goes to show that from 4 per cent. to 5 per cent. is ample. In a few cases larger amounts have given better yields, but when the cost of the extra amount was figured out the increase did not pay for the extra outlay. All recent experiments show that phosphoric acid is a controlling factor. Of this there should be a surplus which will not be lost, but is available for subsequent crops. In a dry time the soluble phosphoric acid tends to revert or lock up. When rain is lacking until late in the season (which will make the plant food again available), if there is a minimum of this food, not enough will become available in the short time in which it is needed.

A very good potato fertilizer for ordinary soil, when one applies all three at planting time, can be made from 400 pounds of nitrate of soda, 200 pounds high-grade tankage, 1,200 pounds of South Carolina rock and 200 pounds of muriate of potash. This will analyze 3.7 per cent. nitrogen, 9.4 per cent. phosphoric acid and 5 per cent. of potash, and, if the chemicals are purchased, should cost not over $28, including mixing. In the season of 1915, with the scarcity of potash, and consequent almost prohibitive price, ordinary directions relative to potash are non-effective.

In many cases, from an economic standpoint, potash may be left out or reduced to the minimum. I would pay no more for potash in the sulphate form for potatoes than for the muriate. In spite of the contention that chlorine in the latter will give the tubers a strong flavor, all tests fail to show any difference, even when an excessive quantity is used. The amount of fertilizer per acre will depend on the condition of the soil, usually not less than 500 pounds in combination with manure, or on very fertile soil, or with a clover sod. When these are lacking, 1,000 pounds seems to be the most profitable amount. True, many use as high as 2,000 pounds and claim it pays. Professor Sirrine has made exhaustive tests on Long Island soils, extending over a period of years, with the following result with potatoes at 50 cents per bushel. Had the price been higher the larger quantity might have paid.

Fertilizer	Cost	Increased yield per acre	Money gain
500 lbs.	$ 6.25	23.3 bu.	$ 5.40
1000 lbs.	12.50	44.3 bu.	10.60
1500 lbs.	18.75	55.4 bu.	8.97
2000 lbs.	25.00	61.4 bu.	5.70

My own practice has been, when using only 500 pounds, to apply it all in the drill; with a larger quantity, the balance broadcast, because the feeding roots extend all through the soil. This seems logical. Further, if a large amount is put close to the seed, and heavy rains follow planting, there is often injury to the seed. Hence, it is always wise to mix the fertilizer with the earth.

PRESERVATION OF THE GREEN LEAF

Anything which destroys the leaf surface reduces the starch making machinery, and though there may be an abundant water supply, ample available plant food of the right sort, and greatest vigor of plants, if the leaf surface is impaired or destroyed, all will be for naught.

INSECTS

In many sections the flea beetle is very destructive, but where bordeaux is used the damage has been very slight. Not that it kills the beetles, but being very distasteful it drives them away, perhaps to feed on something less valuable, or it may be they starve.

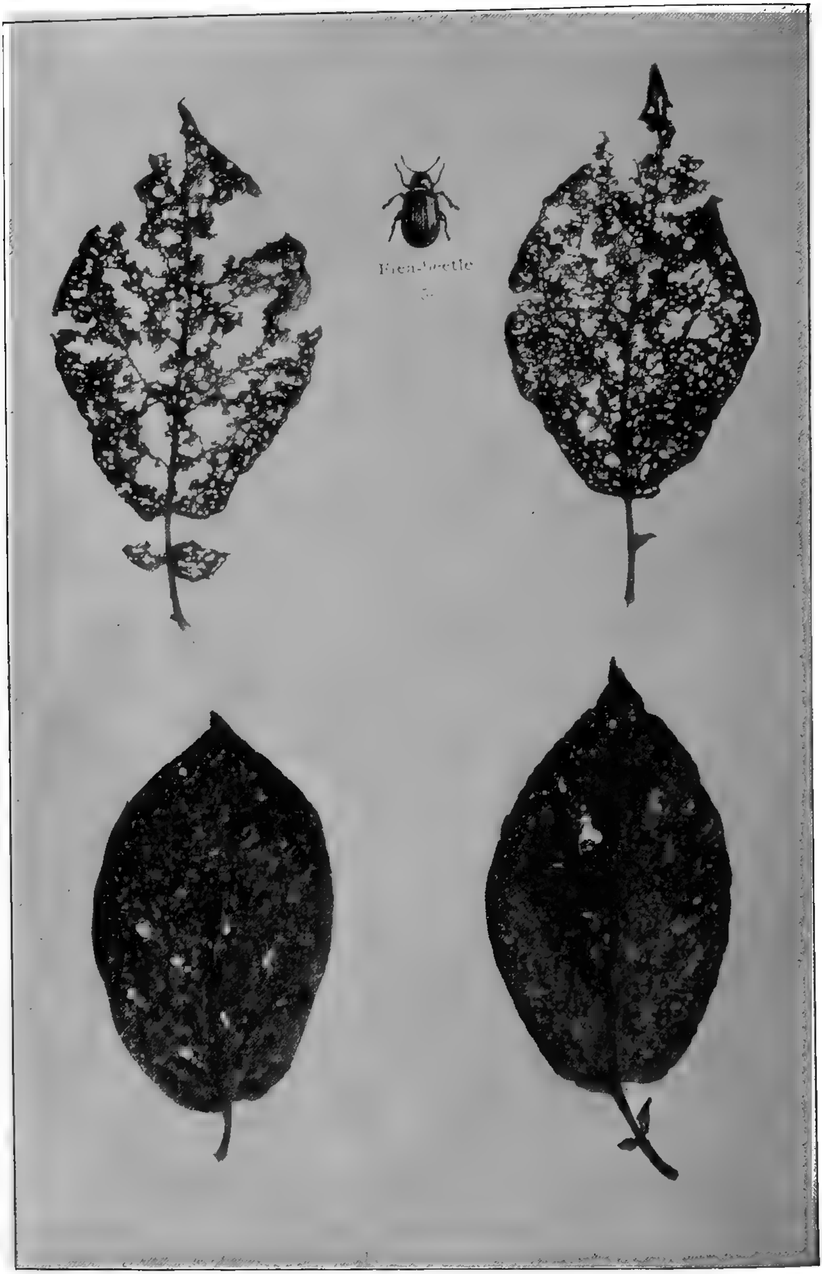


Fig. 419.— The Potato Flea Beetle and Its Work. Upper Leaflets From an Unsprayed Plant, Lower Ones From a Sprayed Plant

Like the poor, the Colorado potato beetle is ever with us, and, although there is an occasional year when they do little injury, the following year is likely to see them abundant. If left unmolested, they will often, in forty-eight hours or less, so defoliate

FIG. 420.—SPRAYING POTATOES WITH A KNAPSACK SPRAYER

the plants as to reduce the yield below the point of profit. This emphasizes the importance of putting the poison on in time. Often a very little, just as the old hard shells appear, before they deposit their eggs, will prevent further injury. The old stand-by has been, and in many places still is, paris green. This has many objectionable features. First, the arsenic is soluble and the foliage is burned by it. I am sure we have suffered more than we have realized from this. Professor Jones, late of the Vermont Ex-

periment Station, once told me, that 50 per cent. of the potato leaves sent to him for examination for blight had simply paris green injury. Next, being in the form of an amorphous powder, it washes off quickly, and if applied before the bugs are well hatched out, the application must be repeated, materiall increasing the cost. With these facts before us, I recommend arsenate of lead. This will not injure the foliage in any quantity. It is in a paste form and will adhere a long time. Hence, it can be put on with impunity when the bugs first appear, and it will remain for those hatching later. It is not so quick in its action as the green, and many who have tried it have complained that it did not kill the bugs. This was my own experience the first time I used it, waiting until the bugs were abundant and applying it with a sprayer which did not thoroughly cover the vines. Since I have learned to use it at the first appearance of the bugs, and apply it in such a way that every leaf is covered, I have frequently found one application sufficient for the season.

Arsenate of lead is sold on a guaranteed analysis of the arsenic oxide it contains. Therefore, one can readily determine its commercial value, and also how much to use. If, for instance, 1 pound of paris green — which should be 50 per cent. arsenic — to 50 gallons of water has been found sufficient to kill the bugs, one should use 3½ or 4 pounds of the lead to a like amount of water, or bordeaux.

DISEASES

A disease which does much injury is "tip burn," often mistaken for blight, but entirely different. The life history of this has not been thoroughly worked out. One theory, and to my mind a very plausible one, is that when the early part of the season is wet and the plants heavily fed with nitrogenous fertilizers, a rank, rather soft growth follows. Later in the season it turns dry. There is more plant than can well be supported, and the extremities of the leaf, farthest from the source of supply, and being only imperfectly nourished, is easily affected by the disease germ which the more vigorous parts of the plant resist. Bordeaux is a good remedy, but it must be evident, if the above is correct, that an abundant water supply and plant food are conditions which make this disease less likely to occur.

BLIGHT

Taken altogether, the most serious foe to the potato is the blight. It is so insidious in its attacks that if preventive measures are not employed early in the season it will often ruin a potato crop in twenty-four hours. The late blight is the one most in evidence and most destructive. It is peculiarly a wet weather disease, the spores of which, so far as is known, live over winter only in the old tubers. When such infested tubers are planted and the earth becomes warm and moist, these spores multiply and burst from their cells, so that the soil literally swarms with them. Many, of course, die; some find their way to the surface. Often, when the plants are five or six inches high, a heavy rain will beat them down to the earth where they come in contact with the blight spores. If the weather continues wet, these multiply and penetrate the leaf. Later they spread to other leaves and live on the leaf tissues. When weather conditions are favorable, i. e., wet, they increase at an enormous rate, and so destructive are they that a field will often turn black in a day. If the wet is excessive, these spores are washed from the tops to the ground, and so to the tubers again, and rot often follows — always infection. Here is another reason for deep planting. Tubers are less exposed to the spores and being deeper and cooler in the spring, fewer spores germinate and come to the surface. There is no cure after the spores are established, but it can be prevented by what is known as the bordeaux mixture, viz., 5 pounds of copper sulphate (blue vitriol), 5 pounds of lime and 50 gallons of water. If this is thoroughly applied early, before the leaves are contaminated, it copperplates them, as it were, and the blight spores die because they can not gain an entrance. It must, therefore, be applied in season, thoroughly, so as to protect the whole plant, and often enough to cover the new growth. Sometimes one spraying before the spores come from the ground has been sufficient. Usually three give excellent returns. Again, five are even more profitable. Much depends on the season, as well as on the time and thoroughness of the work.

There is no question as to its practicability, in proof of which I call attention to Bulletins No. 323 and 349 of the New York State Experiment Station, which may be had for the asking. Briefly stated, the facts are these: For seven years the station

FIG. 421.— POTATO PLANT ATTACKED BY LATE BLIGHT

has been carrying on cooperative experiments with farmers scattered from one end of the state to the other. The farmer does the work according to his own method, the station provides for proper check rows, and assists in measuring the areas and weighing the product. The grower keeps accurate account of all expenses and profit or loss from the spraying. During the seven years the average cost of spraying an acre has run from $4.15 to $5.90. The increased yield per acre has been from 18.5 bushels to 62.2 bushels and the net profit per acre from $8.53 to $24.86. This is the average highest and lowest return from all the experiments in different years. The greatest gain, of course, has been in years when blight was severe, the smallest being in 1908, when there was scarcely any blight. Doubtless, much of the gain that year was due to decreased damage from flea beetles because of bordeaux applications. The average increase in yield per acre for the entire period was 44.1 bushels, with an average net profit of $16.77 for the seven years. At Geneva the gain per acre due to spraying every two weeks was 97.5 bushels; at Riverhead 45.7 bushels. The gain due to spraying three times at Geneva was 69 bushels; at Riverhead 25 bushels.

Few appreciate the fact that the potato makes its most rapid growth in the last two weeks of its life. If the green leaf, then, is impaired or destroyed before the plant has lived out its natural life, the yield may be so decreased as to do away with the profit altogether, or the increase by preserving it by spraying, after paying the expense, is clear gain.

RECAPITULATION

To briefly summarize and emphasize the foregoing it is apparent:

1. That humus well mixed with the soil, and frequent surface stirrings of the same, will materially help to store up and retain moisture or a water supply against the period of greatest need, when the tubers are forming and the tops are evaporating water most rapidly.

2. That deep plowing and planting and non-hilling in ordinary dry seasons will all tend to the conservation of moisture.

3. Strong, healthy seed, in well-tilled soil, with an abundance of available plant food of the proper kind, promotes a vigor of both top and tubers, which will resist disease much better than a weak plant.

4. To insure the greatest development of starch the leaf surface must be preserved until the potato has completed its life cycle.

Surely, then, a line of procedure most in harmony with the laws of nature governing the potato plant will be most likely to insure a crop.

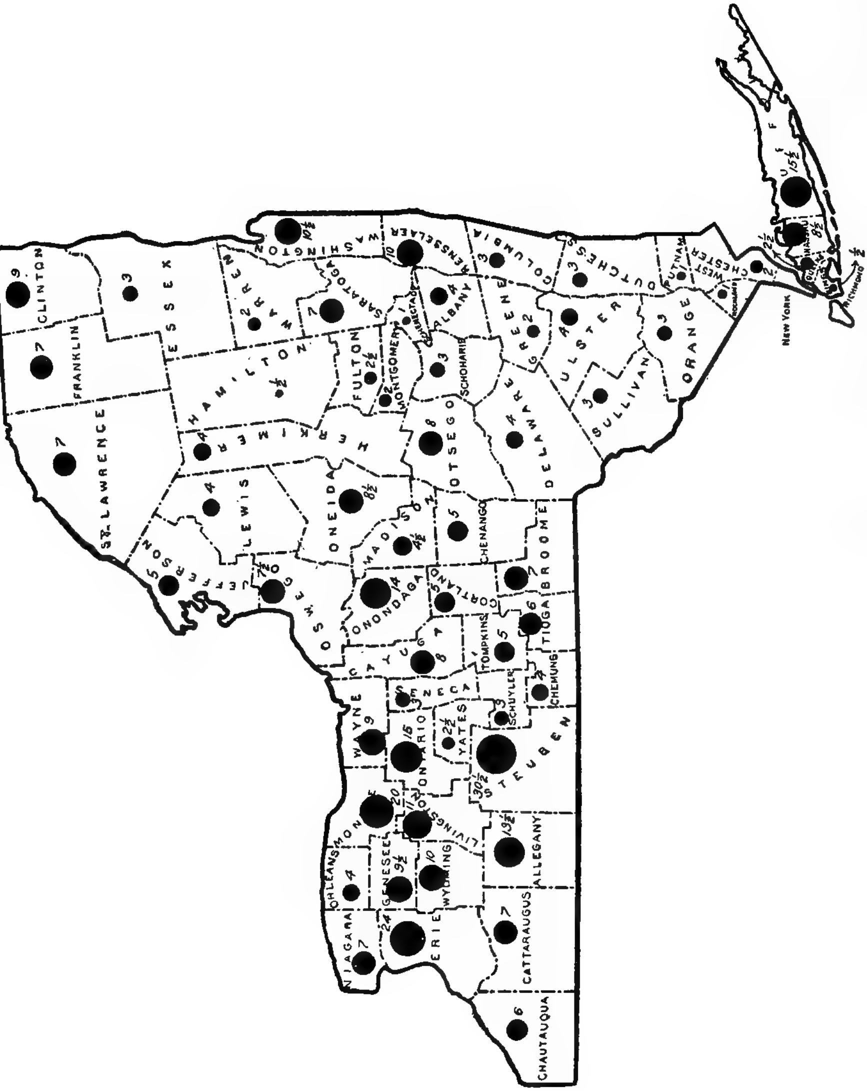
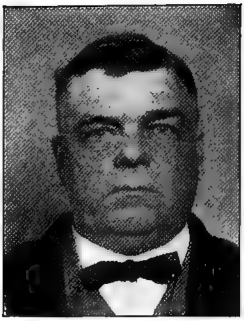


FIG. 422.— MAP SHOWING POTATO ACREAGE. FIGURES IN COUNTIES REPRESENT ACRES BY THOUSANDS.

ONIONS

W. H. Ellis, Livonia, N. Y.



This article will be confined to the onion business as conducted by the growers of South Lima, N. Y.; the fundamental principles are the same everywhere.

THE SOUTH LIMA ONION LANDS

Some thirty-five years ago there was a swamp of about seven hundred acres located at what was then called Hamilton Station, now South Lima, which for sanitary reasons was drained. Soon some of this land was used for the purpose of growing broom corn, willows, etc. Finally onions were tried on a small tract and the result was so satisfactory that South Lima muck sprang into prominence as an onion producing section, and has held a leading place ever since. The entire seven hundred acres have been cleared and nearly one-half of it is annually devoted to the cultivation of onions.

VARIETIES

The varieties presented by seed houses are many but by a process of elimination have been reduced to very few. Ten or twelve years ago, growers usually sowed an equal amount of red and yellow seed. Sometimes the red sold better than the yellow, sometimes the reverse. But at the present time there seems to be almost no demand for the former; the yellow variety is grown almost entirely. It is said that one reason for the change is that the Jews, who are among the largest consumers of onions, never buy red ones.

The Yellow Globe Danver is a popular variety and for early maturity is probably the best. The Ohio Yellow Globe is also good and perhaps will yield more bushels to the acre than the other varieties, but the Southport Yellow Globe is the most generally grown here.

The Danver and the Ohio are slightly flattened at the top. The Southport is almost a perfect sphere, with an extremely small neck, and is a good keeper.

SEED

Where to obtain the best seed is a question which puzzles every grower. Every catalog will claim that the seed it advertises is the best, or at least as good as any, but every year some one is taken in by a house selling onion seed of poor quality. Sometimes a firm will sell seed which will grow onions of as many different colors as Joseph's coat, and if one looks at the package in which the seed came he will find this legend, "This company gives no warranty, expressed or implied, in regard to its seeds."

The best way is to grow one's own seed. When securing onions, carefully select the best bulbs, choosing for color, shape and size. From a bushel of bulbs will often be gathered three or more pounds of seed.

By putting the seed in a tub of water and throwing away all that does not quickly sink to the bottom, only the good is saved.

The seed grown by a South Lima man, tested at New York State College of Agriculture a year ago with seed from several of the largest seed houses, was found to be the best.

Five pounds of seed that will test 80 per cent. or better should be enough for an acre. It used to be said that one ought to sow at least six pounds in order to have some for maggots and other troubles that are sure to beset the crop, but the smaller amount is more in favor now.

FERTILIZERS

After the seed question comes that of fertilizer — certainly an important one.

The onion is a gross feeder and plant food must be supplied in liberal quantities. It should be a kind that is quickly available. A high-grade fertilizer with 4-8-10 analysis is a popular brand, though some prefer to use 2-8-10. In either case about a ton to the acre should be sown broadcast before the seed is sown. Some prefer to sow but part of the fertilizer then and the balance later in the season when the onions are one-half or two-thirds grown. If the season is a dry one it is doubtful if the crop derives much benefit from the late sowing.

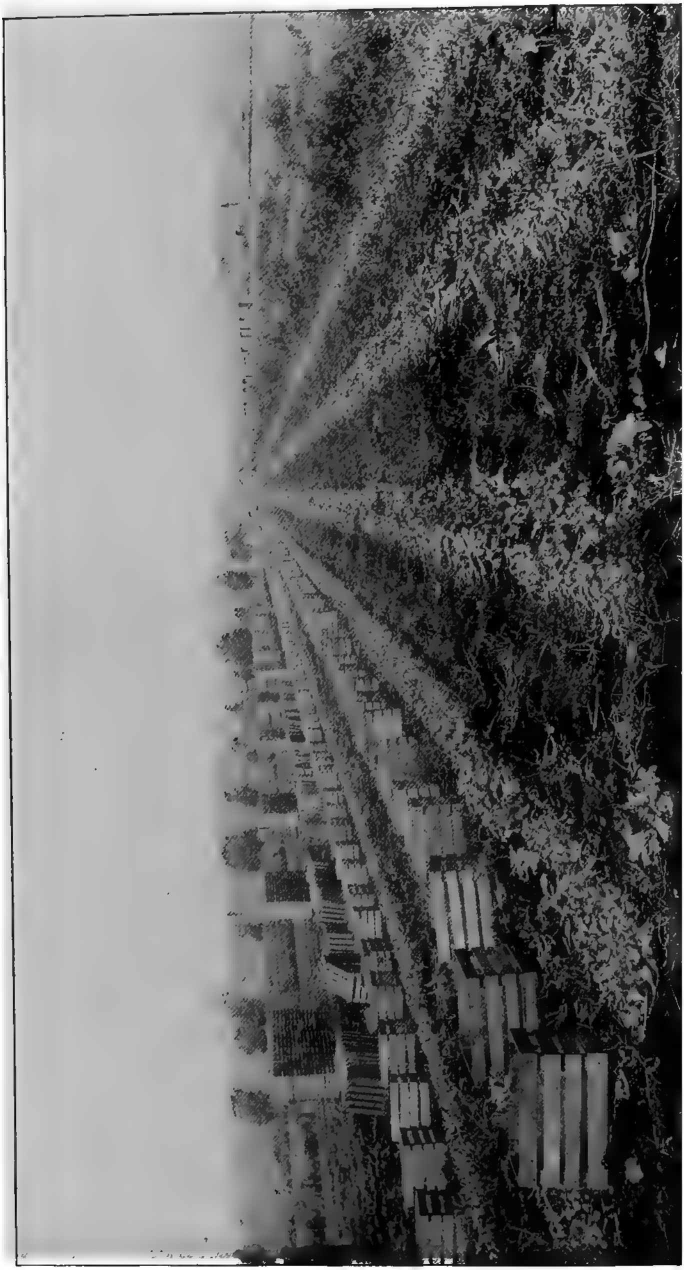


FIG. 423.—CRATES READY TO RECEIVE THE ONION CROP

Good results are often obtained from sowing nitrate of soda in the middle of the summer if there happens to be a wet period.

If a second application of fertilizer is to be made it is a good plan to use a disc just before sowing the fertilizer, which will leave a little trench on each side of the row; then, with the hand fertilizer machine, sow the fertilizer in the trench. If this is followed by a mulcher (a machine that looks like a small lawn mower) the ground will be leveled and the fertilizer will be deep enough for the moisture to make it quickly available.

FITTING THE SOIL AND CULTIVATION

As soon as ground can be worked in the spring is the time to begin fitting for onions. It is a good plan to have the plowing done in the fall. Some fit the land on which late celery was grown the previous year, without plowing at all.

A spring-tooth harrow followed by an acme and that in turn by a float will make a bed of muck land in splendid condition and ready for the seed. With a Planet, Jr., or Iron King drill there should be little trouble in getting the seed on evenly.

The drill should be set so as to sow about one inch deep with rows fourteen inches apart. There is a great tempation to make the rows closer but they are much harder to work. As soon as the little onions begin to show above the ground, work should begin.

Several makes of weeders have been put upon the market in the last two or three years that have been a great help. Some growers still look askance at the manufacturers claiming that any machine that will destroy a weed will not tear out a tender little onion. It is true that they will destroy some, but the difference in cost in going over a field with a weeder and of weeding by hand will more than compensate for the onions that are killed.

Hand weeding is what makes onion growing so costly. Hand weeding has to be done three or four times, but with the judicious use of a weeder this can be reduced to once or twice. Weeding should be followed by almost constant work with the cultivator until the onions are quite large.

The onion is a surface crop and care must be exercised not to cut the roots when the plant has grown large enough to send them out of the row. For this reason a shove hoe is probably the best

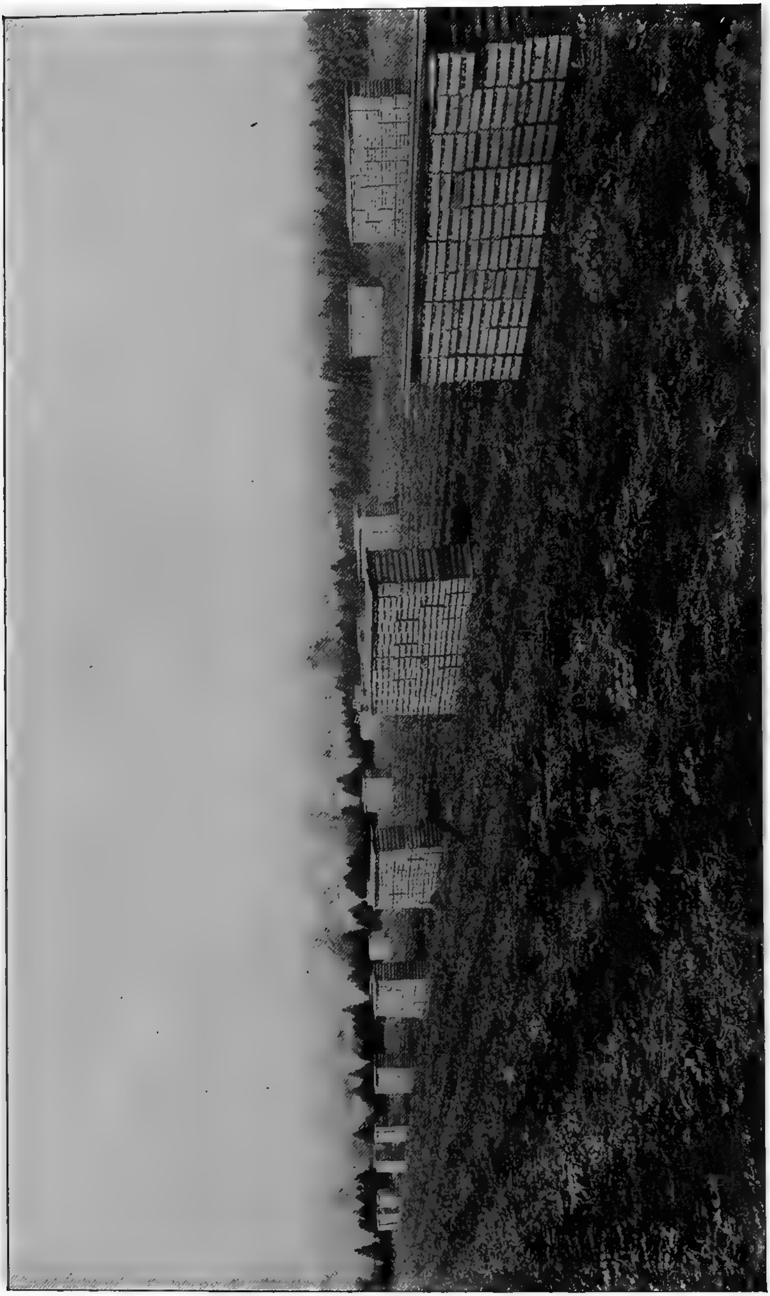


Fig. 424.—Onions Stored in Crates in Field for Curing

tool to use in performing the last work in an onion field. The disc and wheel cultivator go too deep, while a shove hoe in the hands of a careful man, need only skim the surface.

HANDLING THE CROP

About the first of August the neck of the onion will become soft, and some morning the whole crop will be flat upon the ground. Very soon after this they are ready to pull.

If the grower has a large acreage he will have a machine for topping. These machines range in size from small ones that three men can run and which will top a few hundred bushels a day, to those which require a dozen men to run and which will top several thousand bushels a day. Small growers still do this work

FIG. 425.—ONION CURING SHED AT LEFT, FILLED WITH EMPTY CRATES; ONION STORAGE HOUSE AT RIGHT

by hand, and in pulling the onions will pull two rows at a time, laying them carefully with the bulbs in one row and the tops drawn out at right angles to it. The next two rows are placed in a parallel line with the tops extending in an opposite direction from those in the first line. Then with sheep shears the tops are cut off and the onions of four rows are left in one.

Crates are then taken into the field, the onions are picked or shoveled up and the crates are piled in rows usually four high and covered with boards to protect from storm. The next work is screening. Only those onions which are large enough to go over an inch and a quarter screen are first. Those which fall through the screen usually sell for half as much as the larger ones.

After the crop is harvested there comes the great problem of disposing of it. Whether to sell from the field or place in storage and wait for an advance in price, is the problem. The onion reports are of value, but it is a very wise man indeed who can tell anything about what the market will be.

Unless the grower has his own storehouse there must be a great advance in price in order to make the storing profitable, for the cost of storage and the shrinkage in weight will soon wipe out all the profits there may appear to be in an increase of price per bushel.

COST OF GROWING THE CROP, AND YIELD

The cost of growing an acre of onions is about $135.00. Sometimes a thousand bushels will be grown on an acre, although eight hundred bushels is considered a good crop. The average price per bushel received by the grower for the last ten years is about 50 cents, so that one can reasonably expect a net income of two or three hundred dollars from each acre.

DIFFICULTIES

An old Irishman who had grown onions for years, when asked what effect a flood would have upon a crop, replied, "Inions, inions, little divils, you can't kill 'em!" But there are several things that may reduce the yield to a point where it ceases to be profitable. The chief troubles are the maggot, thrip and blight.

The maggot appears upon the scene very early. When the plants are only three or four inches high one of them may seem wilted. Investigate, and two or three maggots may be found in the plant. These maggots would develop into flies which would lay eggs from which maggots would be hatched and so on all summer, and every maggot takes its toll from the onion crop. To prevent the maggot, some recommend the use of kainite, others salt; but while these may discourage the maggot somewhat, it is doubtful if they are very beneficial.

The thrip comes next and makes its presence known by the spotted appearance of the stalk. Nothing has been found as yet that is effective in fighting this pest.

A little later comes the blight. The tips of the stalks turn brown, and gradually the entire stalk becomes brown, the bulb

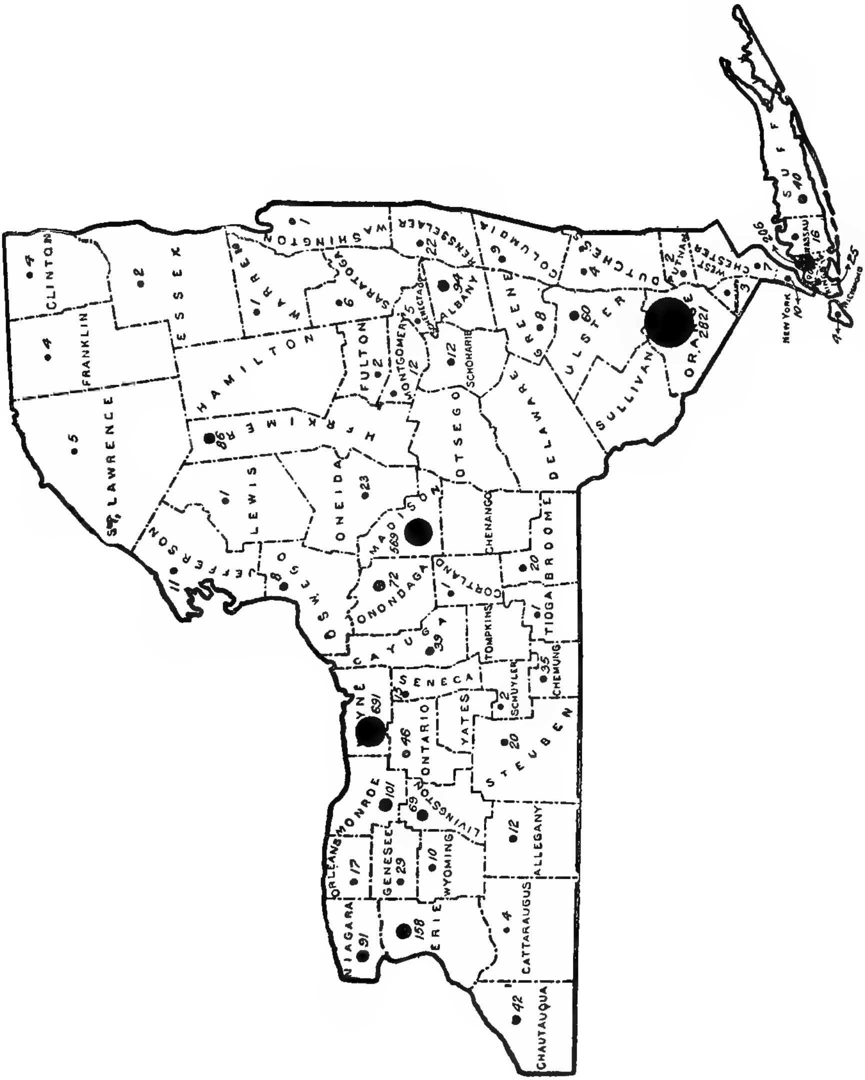


FIG. 426.— MAP SHOWING ONION ACREAGE. FIGURES REPRESENT ACRES IN UNITS

stops its growth, and everything is at a standstill. It is claimed that spraying with bordeaux mixture is a preventive but the difficulties attendant upon doing this are many. It would seem that good drainage, sufficient fertilizer, thorough cultivation, and keeping the plants growing all through the season is the best and only way to fight the enemies of the onion.

TOMATOES

C. C. Hulsart, Matawan, Monmouth County, N. J.

HISTORY

In an article of this kind it is interesting to note the history of the tomato, its gradual rise in popularity and the rapidity with which new varieties appeared when once its position was assured. Originally an American contribution to horticulture, it was first used as food by the Latin races of Europe.

Philip Miller in his Gardeners' Dictionary, 1731, says, "The Italians and Spaniards eat their apples (love apples) as we do cucumbers — with pepper, oil and salt — and some eat them stewed in sauces, etc., but, considering their great moisture and coldness, the nourishment they afford must be bad. In New Orleans they were used in catsup as early as 1779, but in the English colonies tomatoes were planted only as ornaments, under the name of "love apples."

In 1798 the tomato was introduced near Philadelphia but was not sold as a vegetable until about 1829. In 1836, however, it had begun to be popular as food. Thomas Bridgman, in his Kitchen Gardeners' Instructor, tells us that at this time the tomato was used in sauces as desert, as a substitute for peaches, and that it also made excellent pies and tarts. There were only two varieties, however,— the large red and the cherry.

Their use gradually increased, and in 1841 "they had become almost an indispensable dish through the summer months on every table." In 1847 there were six or seven varieties, with but little difference in them. By 1860 hundreds of acres were planted with this fruit in the vicinity of Philadelphia alone, and some efforts had been made to secure improved sorts, a smooth kind being especially desired. Shortly before 1860 a large,

smooth, red variety became popular. At this time there were, besides the yellow and cherry kinds, but four varieties, and only two of these were widely known.

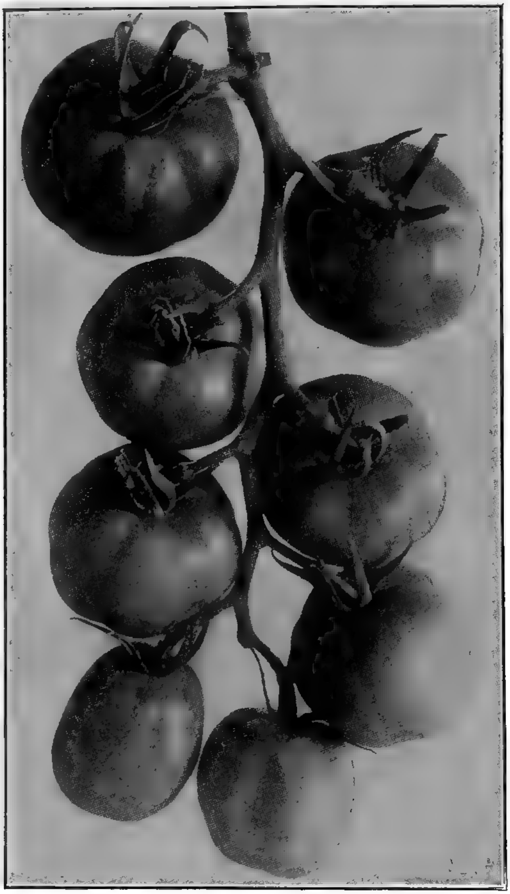


FIG. 427.— NEW STONE TOMATO. THIS IS CALLED THE KING OF THE LIVINGSTON KINDS, WHICH ARE THE BEST TYPES OF LARGE, SMOOTH, SOLID, "BEEFY" TOMATOES

VARIETIES

In 1865 the tomato was a universal favorite. It had become a commercial staple and one thousand acres are said to have been devoted to its cultivation in the neighborhood of Philadelphia. During that year the Tilden appeared and at once took first rank.

This variety was introduced by Henry Tilden of Davenport, Iowa. In the next five years the Maupoy, Foard, Eureka, Cook's Favorite, Boston Market, Dixey, Crimson Cluster, and General Grant were introduced, the General Grant being the best of the number and a really good tomato. In these five years more varieties were brought forward than had been known during the preceding fifty. The canning industry consumed thousands of bushels, and the interest in the tomato was widespread.

For many years lovers of the tomato had been selecting seed in order to improve the existing sorts and the new varieties were the outcome of this work. The best variety introduced up to that time was the Trophy, introduced in 1870 by Colonel George E. Waring of Ogden Farm, Newport, R. I., who was a farmer and a sanitary engineer. The time was ripe for a tomato of a new type, one which would be large and early, and, above all, with a regular apple-like form. The Trophy came at the right time and it was the right thing. Its success was assured — it was unbounded. It was almost the making of modern tomato culture. The Trophy was the result of twenty-three years of careful selection and in spite of the high price ($5 for 20 seeds) it was soon widely distributed and became a universal favorite. From six varieties in 1860 the number increased to thirty in 1880 and by the opening of the twentieth century American seedsmen were cataloguing about 250 varieties. Of these, possibly 50 may be distinct and better than the Trophy.

The evolution of the tomato in less than a century has been exceeded by no other fruit or vegetable. Today we have upwards of three hundred strains and varieties so varied that some of them must suit the most skeptical. We have in colors various shades of red; then we have the pinks and deeper purple varieties. These are very popular in certain markets but tender in flesh and poor carriers if allowed to ripen before shipping. Furthermore, we have several shapes and shades of the yellow varieties. These last are only valuable for preserving, and can not be disposed of in large quantities. Eliminating the yellow sorts, the red and purple varieties may well be divided into three classes — the early sorts, the medium and the late. In some tomato growing sections the early and medium early varieties are all that are considered

because these varieties are more valuable when marketed than any of the late sorts. This is generally the case when the location is within easy shipping distance of some large city. On the other hand, where the cost of shipping is too great, the late varieties are grown for canning purposes or for making catsup.

GROWING EARLY TOMATOES

The early crop although the most expensive to grow is at the same time the most profitable where it can be grown successfully

FIG. 428.— WELL-GROWN TOMATO PLANTS READY FOR TRANSPLANTING

and marketed economically, but it requires far more skill to produce it: First, the seeds must be planted in a manure hotbed or greenhouse about two and one-third months prior to the time the plants can be planted out in the field. They are grown in the seed bed until about five weeks old and then transplanted to cold frames. The beds must be made by using about three inches of manure (new horse manure preferred) on which is placed five

inches of good soil and raked level. This soil should be made up of about one fourth rotted animal manure and three fourths loamy soil, and should be worked over together before placing on the beds.

When the beds are completed and raked level, mark off four and one-half inches each way for the first early sorts; set the little seedling plants in each cross or check, being careful not to set the plant below the seed leaves. Deep planting is dangerous at this season of the year. As fast as plants are set put on sashes, and, if much wilting occurs, shade the glass for a day or two during the warm part of the day. As soon as the plants begin growing give plenty of air by raising the sashes, and when the weather becomes warm remove them altogether. This gives a strong and hardy plant that will stand conditions when set in the field.

The cold frame beds will soon dry out and require watering. At first, while plants are young, light waterings will answer, but as the plants become larger more copious wettings will be required. One good wetting that penetrates deep into the soil is worth two or three light ones that moisten the soil only half an inch.

Plants in cold frames should be in full bud and an occasional bloom in five weeks after setting. The last week, or at least four or five days prior to removing to the field, sashes should be removed entirely both day and night to allow the plants to harden. For the same purpose they should not be watered during this period.

The early tomato crop can not be grown to advantage on heavy soil as it warms up too slowly in spring; hence a sandy or sandy loam soil is essential for best results, and the soil need not be very rich.

MANURE AND FERTILIZERS

If the soil is too rich a heavy vine growth will be the result at the expense of fruit. Rather start with a comparatively poor soil and then feed with animal manures spread broadcast before plowing at the rate of eight to ten tons per acre, after which use three hundred pounds of some high-grade fertilizer in the hill under the plants, incorporating it well with the soil before setting out the plants. A fertilizer made up from high-grade materials

and analyzing 7-7-5 gives very good results when used at the rate of three to three hundred and fifty pounds per acre. This on some light soil is supplemented by a dressing on two sides of the plant early in its growth of about one hundred and fifty pounds of nitrate of soda. An excessive use of nitrate of soda is to be avoided because when used in large quantities it produces too much vine growth at the expense of fruit. And what nitrate of soda is used should be used as early after plants are set as possible, because at that time there are less nitrates available from natural sources than would be the case later when nitrification is more active.

FIG. 429.—TOMATOES GROWING AT WILL, THE GENERAL PRACTICE WHERE GROWN FOR CANNING

Cultivation must be done early and often and should be continued as long as the vines will permit working between them. Many growers produce what is known as a second early crop. For this purpose a little later variety is chosen, not because it is a little later in ripening but because by its being a little later in ripening it is a better tomato, smoother and larger, hence sells at a higher price. Among the many varieties chosen for this crop are Bonny Best, Dwarf Champion, Twentieth Century, Dwarf Stone, John Baar (new), and many others.

THE CANNING CROP

Last but not least comes the canning crop. In many sections this is an important crop, thousands of acres being grown annually. The crop is handled from seed to maturity so radically different from the early crop that special mention should be made of it in an article of this kind lest some one go astray by trying to grow the late varieties by early methods as herein set forth.

Late varieties, with the exception of the dwarfs, are by nature heavy vine makers; hence it is easy to induce them to overdo that propensity, and when we do this we do it at the expense of fruit. Then too, this crop grows at a season of the year when the soil is warmer than it is when the early crop should be hustling; hence no stimulation by applications of nitrate of soda should be used as a supplement. Neither do we want as much animal manures, seven to eight tons being plenty on soils in a good state of fertility. The fertilizer formula should also be changed. A 4–8–10 is what is commonly used by progressive growers and the quantity reduced from 25 to 30 per cent.; but on poor soils a side dressing of the same fertilizer in place of the nitrate of soda is frequently given with good results.

The plants for this crop are seldom transplanted but set in the field direct from the seed bed; hence the plants are much more cheaply grown. They should be grown in a bed under glass and not out in the open as is commonly done, because when grown in the open, unprotected, they are slow in growth, not permitting the planting in the field soon enough to harvest the whole crop before cool nights and possible early frosts claim a portion. The late crops for the can house should be in the field by the end of the first week in June and the further north we go the earlier they should be planted. The custom here is to mark off our tomato fields in checks four feet each way for the early sorts and four and one-half for the medium and late sorts, and cultivate in both directions. The principal varieties for early are Earliana and King of Earlies; a few are still growing Maule's Earliest. While the pink or purple varieties are good, not as many of them are grown as formerly.

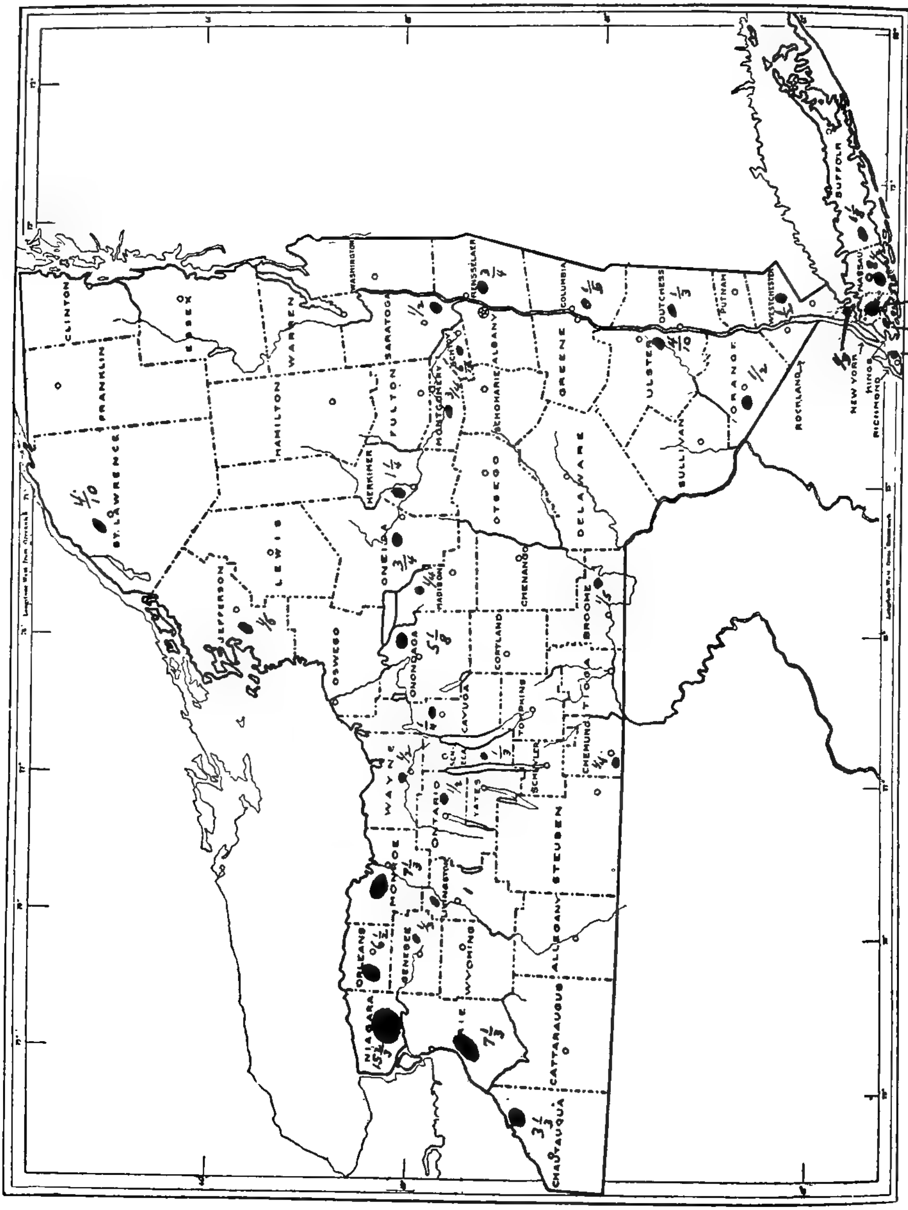


Fig. 430.— Map Showing Tomato Acreage. Figures in Counties Represent Acres by Hundreds.

For late tomatoes either for market or cannery, there are a number of varieties or strains. Among the best are the old paragon, Matchless, Stone and Success. The last named in my judgment is the best for can house purposes. The Stone is best for market because it is harder and stands up better but is a shy cropper. The Success is a heavy bearer, is of a deep red color, but is a little later in maturing than either of the others. An acre of tomatoes for cannery can be produced for from forty to forty-five dollars per acre, and ten tons should be the yield. The writer has produced fourteen tons and slightly over, but this is the exception rather than the rule.

ACREAGE AND VALUE OF TOMATOES GROWN IN NEW YORK STATE BY COUNTIES

(Taken from U. S. Census, 1910)

County	*Acres*	*Value*	*County*	*Acres*	*Value*
Albany	400	$42,961	Oneida	63	$12,540
Allegany	2	100	Onondaga	514	38,385
Bronx	.....	....	Ontario	41	2,857
Broome	18	3,346	Orange	48	6,009
Cattaraugus	12	1,006	Orleans	659	37,126
Cayuga	22	3,610	Oswego	8	2,136
Chautauqua	335	28,153	Otsego	.....	....
Chemung	23	2,839	Putnam	.....	....
Chenango	.....	....	Queens	1,054	111,281
Clinton	6	2,100	Rensselaer	71	7,540
Columbia	20	2,352	Richmond	487	35,992
Cortland	.....	....	Rockland	12	1,880
Delaware	.....	....	St. Lawrence	39	3,221
Dutchess	26	3,398	Saratoga	44	8,411
Erie	738	68,863	Schenectady	59	9,233
Essex	6	300	Schoharie	4	850
Franklin	8	775	Schuyler	1	150
Fulton	7	391	Seneca	28	3,557
Genesee	32	1,626	Steuben	3	730
Greene	13	1,263	Suffolk	117	10,882
Hamilton	.....	....	Sullivan	1	85
Herkimer	124	3,237	Tioga	.....	....
Jefferson	17	2,550	Tompkins	9	1,660
Kings	35	2,464	Ulster	38	4,277
Lewis	1	32	Warren	3	1,050
Livingston	101	4,609	Washington	3	175
Madison	24	1,947	Wayne	40	2,700
Monroe	730	73,915	Westchester	48	8,812
Montgomery	76	9,329	Wyoming	1	320
Nassau	854	100,625	Yates	10	622
New York	34	3,443			
Niagara	1,567	98,088	The State	8,636	$775,803

* TRIUMPH OF THE ITALIAN TOMATO

The tomato was given to the world by America, but Italy is today teaching the rest of the world by example how it should be raised and how it should be preserved. Italian canned tomatoes have practically pushed the American product out of the English market, and have gained an enormous market in the United States. The Italians raise a solid meaty tomato of fine color and it is so packed in the cans that the consumer is not obliged to pay for a large percentage of water.

Canned tomatoes, however, are put up principally for the export trade. The Italians themselves prefer their tomatoes in the form of sauce, or paste, which is nothing more nor less than boiled down tomato pulp, minus the skins and seeds, as set forth in an interesting manner in a report by Commercial Agent J. Alexis Shriver entitled "Canned-Tomato Industry in Italy," recently issued by the Bureau of Foreign and Domestic Commerce. This sauce is put up in cans and is used by the Italians in a great variety of dishes, of which spaghetti is perhaps the most familiar to Americans.

According to fairly accurate statistics the area planted in tomatoes in Italy is about 22,000 acres, producing about 385,000 tons. The exports to the United States amount to about 20,000,000 pounds of canned tomato and tomato sauce, and some 8,000,000 pounds of the product go to South America. The total value of the tomato exports from Italy is well over $6,000,000.

The skins and seeds that were formerly wasted are now utilized, the former as stock feed and the latter as a source of oil. The crude oil is suitable for soap making and for lamps, and the refined oil is said to be edible. Commercial Agent Shriver's report, Special Agents Series No. 93, may be obtained from the Superintendent of Documents, Government Printing Office, Washington, at 5 cents a copy.

*Taken from Circular issued by U. S. Department of Agriculture, Washington D. C. dated Feb. 9, 1915.

CABBAGE

E. N. Reed, Cortland, N. Y.

As time advances it becomes more and more apparent that each of our vegetable crops must have some special thought if we are to continue their culture.

If one were to pass through some of the older cabbage districts it would be a noticeable fact that a great many fields showed disease while others looked stunted. Many of these conditions might have been avoided had attention been paid to keeping disease off the farm and practicing more intensive cultural methods. With less acreage, still producing the same number of tons, the period between two cabbage crops could be lengthened. The cabbage is one of the crops that requires a very long period before another crop of the same kind is put on the field. If this lengthy period does not occur the soil will become infested with disease and insects, and available plant food necessary for this crop will be lacking.

Because I am a producer of cabbages by the hundred tons does not imply that the work is done in a wholesale way, but rather that attention has been paid to the small details and conditions which go to make yields of twenty to twenty-five tons per acre. Only once in the past six years has my yield fallen below the twenty-ton mark.

With the thought of still keeping at the cabbage business I shall try to offer a few suggestions that will tend toward a longer and more successful period of cabbage culture both from the large and small grower's standpoint. It is always the attention to small things that brings success in larger ones.

DIFFERENT TYPES

The cabbages that are grown in this state can be divided into three classes according to their time of maturity. First comes

those belonging in a class with the Early Wakefield. Most of these are raised by gardeners for early market trade. The plants are started in a greenhouse and carried to the field where they are transplanted. Cabbages in this class are rather small, most of them being conical in shape. Of all the early varieties perhaps the Early Jersey Wakefield is the most popular.

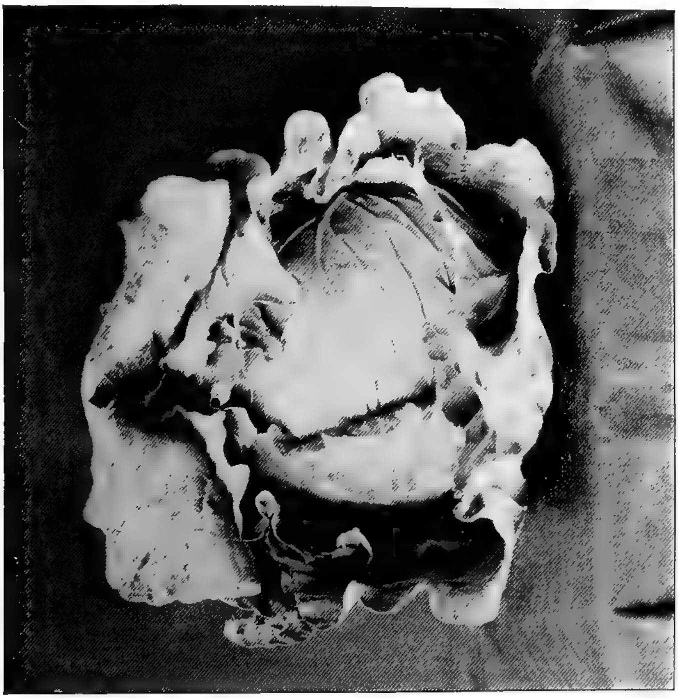


FIG. 431.—ALLHEAD EARLY

The second class covers those called Domestic. The varieties in this class mature in the early fall. They are desirable for both market and kraut purposes. There are three varieties in this class that seem to have considerable merit—the old standard Warren, the Succession and the Autumn King. The Succession has the most uniform type of head of any cabbage I am familiar with. Any one of these true varieties is a heavy cropper.

Third comes the late commercial class. Most all of this class are called "Danish." The Geneva Station collected twenty-two varieties in this class and tested them out; hardly any two looked

alike. The writer has had so much trouble in the past with poor seed from these varieties that he has arranged adequate facilities and is now producing his own. After six years of hard work along this line a strain has been selected that can be depended upon to produce a crop.

FIG. 432.—A CROP OF DANISH CABBAGE

The late varieties are grown to such an extent that they are one of the large cash crops of the state. Most of the heads are more or less round, very solid and have good keeping qualities. There is also a red strain in this class which is not so heavy a yielder, Red Rock being a standard variety here.

SEED

As with other crops, good seed is one of the important factors. Formerly most of our seed was imported, but now a great deal is raised in this country. Michigan, Long Island and Oregon all

lend a hand, each having sections favorable to seed production. So small a quantity is required for an acre that there seems to be a great deal of mixing of varieties. If one does not know positively about the source of his supply it is a very safe way to purchase a year's supply ahead; then it can be tested out.*

The seed can be sown either by hand or with a seed drill. Never sow seed and fertilizer together. The seeds do not need to be covered over one-half inch but the ground should be around them. Never sow seed just before a rain; wait until after the rain when the ground has become dry enough to work again. Cabbage seed objects to coming through a crust formed by a hard shower.

One pound of seed is none too much for two acres, taking into account the uncertainties of the weather and the insect trouble, if the bed is not to be screened. Invest your dollar in seed rather than in some one else's diseased plants. A few extra plants to sell help to pay the cost of seed.

CABBAGE SOIL

The cabbage, being one of our hardiest vegetables, will adapt itself to most soils. Those of a gravelly nature are not so suitable because they will not hold moisture. The crop often does best on the clay loam found on so many hills and uplands of the state. Perhaps why this type of soil was not used for cabbage growing in the past was because it was not properly tilled and well fertilized.

PRODUCING PLANTS

There seems to be as many failures in getting a stand of cabbage plants as in all other failures combined. Care should be exercised in selecting a spot on which to sow seed. The ground should be mellow, well-drained and free from weeds or cabbage disease. Avoid spots where there has been an old manure pile or soakage from a barnyard. In such places club root is apt to develop. It is becoming quite common in some sections to break up a spot in a permanent pasture for the seed bed. Of course this should be done in the fall in order that the ground can be well fitted. It is a good plan to use a liberal dressing of lime or wood ashes on the bed, making it white all over.

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* See article on "Good Seed" by Prof. Myers, page 1305.

Commercial fertilizers are best suited to growing plants because of their freedom from weeds. For one pound of seed I should use nine hundred square feet of ground, and to this apply one hundred pounds of 4-10-8 fertilizer. It is preferable to have all the nitrogen in this fertilizer derived from nitrate of soda. It should be thoroughly worked in before the seeds are sown. In some sections the plants are raised in rows; the fertilizer is sown in rows and worked in.

FIG. 433.—GOOD AND POOR TYPES OF CABBAGE OF THE SAME VARIETY

PREPARATION OF THE FIELD

Sod ground is perhaps best suited to grow this crop. Often a very bad mistake is made by not plowing the ground early enough to preserve all moisture. Fall plowing is best. In the spring the field should be dragged at least once a week until setting time. This will preserve all the moisture and also kill most of the weeds. Very few other crops require so much moisture, or more thorough preparation of the soil.

FERTILIZATION

Cabbage needs plenty to eat as well as to drink, if we expect to get good yields. This does not mean that it needs wet land. I like to think of a cabbage plant as a filter. The soil water is taken in through the roots and the sun evaporates the moisture thrown off by the leaves. What is left in the plant is used for growth.

It takes as much fertility out of the soil to raise five tons of cabbage per acre as it does to produce twenty bushels of wheat.

Manure and commercial fertilizer make the best combination. Ten tons of manure per acre, six to eight hundredweight of 10 per cent. phosphoric acid and 8 per cent. potash usually will supply enough plant food. If no manure is at hand ten or twelve hundredweight of 4–8–10 will answer. This fertilizer is only suggestive. No rule can be given for all the varied conditions.

It takes about one thousand parts of water to make one part of commercial fertilizer all available for a plant.

If the soil needs lime it is a good plan to apply a dressing to the field, since the crop needs a liberal supply. Lime or fertilizer should always be applied broadcast. Spreading the fertilizer has a strong tendency to spread the root system. This is essential since the plant is a gross feeder.

SPACING AND SETTING PLANTS

No one can give a definite rule for the proper spacing of cabbage. The distance apart will depend upon whether early or late varieties are grown, the fertility of the soil, the size of head desired and the moisture supply. It is probably best to raise all early cabbage in drills, the plants set from twelve to eighteen inches apart in rows thirty to thirty-six inches apart. Domestic and Danish need more room. They should be placed from eighteen to thirty inches in the row, the rows being thirty-six inches apart.

Check rowing is practical in some places and meets with excellent results, especially if the ground is weedy. This method reduces hand labor to a minimum, the only objection being that the wide spacing which is generally practical produces very large heads. Heads weighing from eight to twelve pounds are large enough for city trade. The large heads may be avoided if one will set closer and use a narrow cultivator when going the narrow way. The writer very much prefers the check row method.

Cabbage setting is more important than most of us think. Too often there is a fight for a week or ten days before the plants really start to grow. This is caused by spoiling their root system or setting in too wet ground. It is best to loosen the plants in the seed bed when taking them up. The more of the root

system one can maintain the quicker the plant will start. Medium sized plants are preferable to large ones because more of their root system can be maintained. It is not good policy to set plants when the ground is wet as one can not then help packing the ground around a young plant. The sun will dry out this packed earth leaving the plant in the hard, dry soil. There should be a dry mulch of soil maintained around a newly set plant.

FIG. 434.—MASTER'S PLANT SETTER

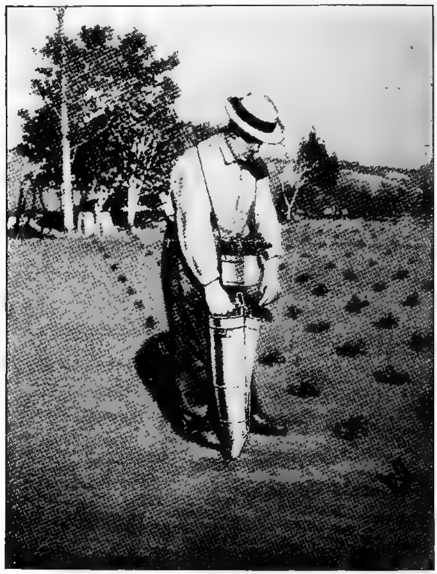

FIG. 435.—PLANT SETTER IN ACTION

Of all setting tools I prefer the "Masters Plant Setter." This little machine places the plant roots down through the dry soil on the surface into that which is moist underneath. It also seals the plant roots to the ground with water, but does not destroy the surface mulch or pack the ground.

These machines are very inexpensive, costing about four dollars. A man can set one acre per day watering each plant, and there is no stooping, dusty work about it. They are adapted to both large and small areas, as three men, each having a machine, can set more plants than a team outfit, and no skips. Every plant will live, making a perfect stand.

CULTIVATION

The cabbage crop is grown through the dry part of the season, therefore frequent cultivation is very essential. Each time the crop is cultivated the evaporation is checked and moisture collects just below the moisture mulch. The moisture is quickly taken up by the root system and then the plant receives an added amount of plant food.

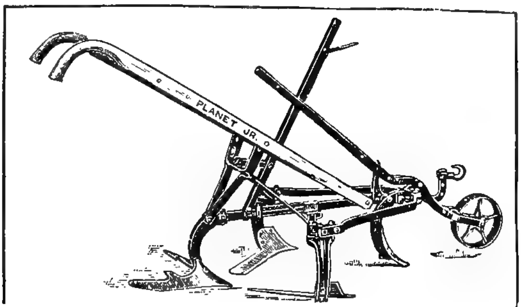

FIG. 436.— PLANET JR. CULTIVATOR ARRANGED AS A MARKET GARDENER'S HORSE HOE, WITH A PAIR OF 10-INCH HOE STEELS AND THE WIDE-FINGERED SWEEP

Shallow cultivation is most essential. Note the difference in the feeding area between two fields, A and B, both being plowed ten inches deep. A is cultivated one inch deep; B three inches.

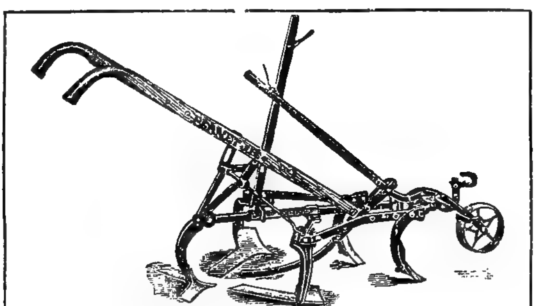

FIG. 437.—CULTIVATOR WITH HOES AND SWEEP IN POSITION FOR SHALLOW WORK. HOES SHOULD BE TURNED OUT FOR LARGE CABBAGE

Field A has nine inches in depth to grow its crop, B has only seven inches. The only time that deep cultivation is justifiable is when the cabbages are growing so fast that they crack. I think the cases will be not over one to the hundred. Generally the

smaller heads will more than make up in growth for the loss caused by cracking.

Fig. 434 shows a Planet, Jr., cultivator rigged for cabbage when the plants are small. When the leaves commence to get large the side blades, or ten inch hoes as they are called, can be reversed so that the long end will run out under the leaves without breaking any off. This allows nearly all evaporation to be checked even when the cabbages are large. Cultivation should be continued throughout the entire season.

CABBAGE DISEASES

The bacterial disease known as stump rot or black heart is the most serious thing a grower can have in his soil. A crop rotation of even ten years does not seem to be a remedy. The cure is — keep it out. Other fields are very easily inoculated by carrying dirt on farm machinery, animals' feet, or feeding stock diseased roughage, then spreading the manure on a non-infested field. Cabbage seeds often carry the disease. They should always be soaked for fifteen minutes just before sowing, in the following solution: for one pound of seed dissolve in an earthern dish one corrosive sublimate tablet in one pint of water. (These tablets may be obtained from any drug store for one cent each.) After soaking, spread the seed to dry, but not in the sun or near artificial heat.

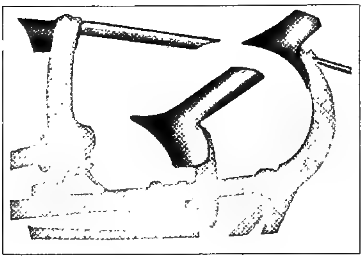

FIG. 438.— SHOWING ARRANGEMENT OF HOES AND SWEEP FOR SHALLOW CULTIVATION

Club root is familiar to us all. A rotation of five or six years is sufficient to kill it if the ground is kept free from all plants belonging to the cabbage family; this includes mustard. It being a slime mold disease, lime greatly helps to keep it in check. Often cabbage raised twice in succession on the same ground will show the disease.

INSECT PESTS

The cabbage has three quite serious insect enemies. First, the flea beetle, a small black bug which eats the leaves of the seed-

lings as soon as they appear above ground. Plaster, lime dust or tobacco dust are of some value in keeping them off, but the most practical method is to screen the bed.

This screening will also control the second of the pests, the cabbage maggot. This enemy is a small, white grub which eats the roots of the seedlings about the time the cabbages are ready to transplant. The adult is a small fly that lays eggs at the surface of the ground just beside the stem of the plant. These eggs soon hatch and the young maggot works downward and feeds upon the root system. In many sections it is impossible to get a stand of plants every year unless the bed is screened. The screening consists of setting up boards eight or ten inches high around the seed bed. Over these boards wires are stretched to prevent the screen from sagging. The screen is made of cheese cloth and is stretched over the bed and tacked to the boards. A bed to be screened should be made not over nine feet wide.

One half pound of seed will produce nearly as many plants under a screen as a whole pound in the open, but one should make the seed bed as large as for a whole pound. Under a screen nearly every seed will germinate owing to the humid condition. Put it on as soon as the seeds are sown and remove about one week before seedlings are ready to transplant. The plants will be ready to set seven to ten days earlier if raised in this way.

Sometimes the maggots bother earlier varieties after they are set in the field. A tarred paper pad about two inches square should be placed around each plant. They are made by punching a hole in the center, then cutting a slit from the hole to the edge. This prevents the fly from laying eggs near the stem of the plants.

Third, is the plant louse. This louse has great power of reproduction, being capable of rearing from twelve to twenty litters of brood in a single season. In turn the young will multiply when only six days old. They are sucking insects and are therefore controlled by the use of contract spray. Three-fourths of a pint of Black Leaf 40, four pounds of whale-oil soap and sixty gallons of water are used as a spray solution. Great care must be taken to wet the lice thoroughly; they will be found in the curls.

For large areas a power sprayer with two leads of hose, each being carried by a man, make the most satisfactory outfit.

In rare cases the green cabbage worm makes considerable trouble. This is a chewing pest and should be killed with poison. The poison solution should contain some bordeaux sticker to make it cling to the leaves.

MARKET CONDITIONS

Most of the early cabbages grown are for local trade, very few being shipped, as are the Danish. The market for these and the Domestics is firmer than for the Danish. A large share of the Danish raised have been stored for winter and early spring trade, but in the last few years there has been large quantities of southern cabbage sent to supply the same market. As a result stored cabbage has brought less money.

The choice of either selling from the field or holding cabbage will usually be governed by certain conditions. For the past few years holding late cabbage either in a cabbage house or laid down has brought very small returns for the labor, unless a man has had some special winter market.

If a grower expects to make a business of holding his crop it is necessary to protect the cabbage from freezing. Some make a practice of laying the cabbage on the ground in some sheltered place, either in the woods or some place in the open where the snow will drift over them. They are placed stump down and covered with straw, swamp hay, or, best of all, leaves, to a depth of perhaps six inches. Some prefer to erect a double-walled building with narrow bins on each side and a driveway through the center. Either method is very satisfactory.

A man will make about as much money to sell his crop every year as to hold it, and it seldom pays to switch from one practice to the other. If the price of cabbage falls much below five dollars per ton from the field there will be very little money made by selling.

The dairy farmer here has a chance to get at least pay for his fertilizer and labor. The general opinion of the dairy farmer is that the cabbages are worth from four to five dollars per ton to feed. I prefer to place them at four. Under average conditions

it will cost not far from four dollars per ton to raise and market a crop.

The average yield of the state is about ten tons per acre. If a grower will raise his yield to twenty tons the cost per ton can be reduced to about three dollars for production and marketing.

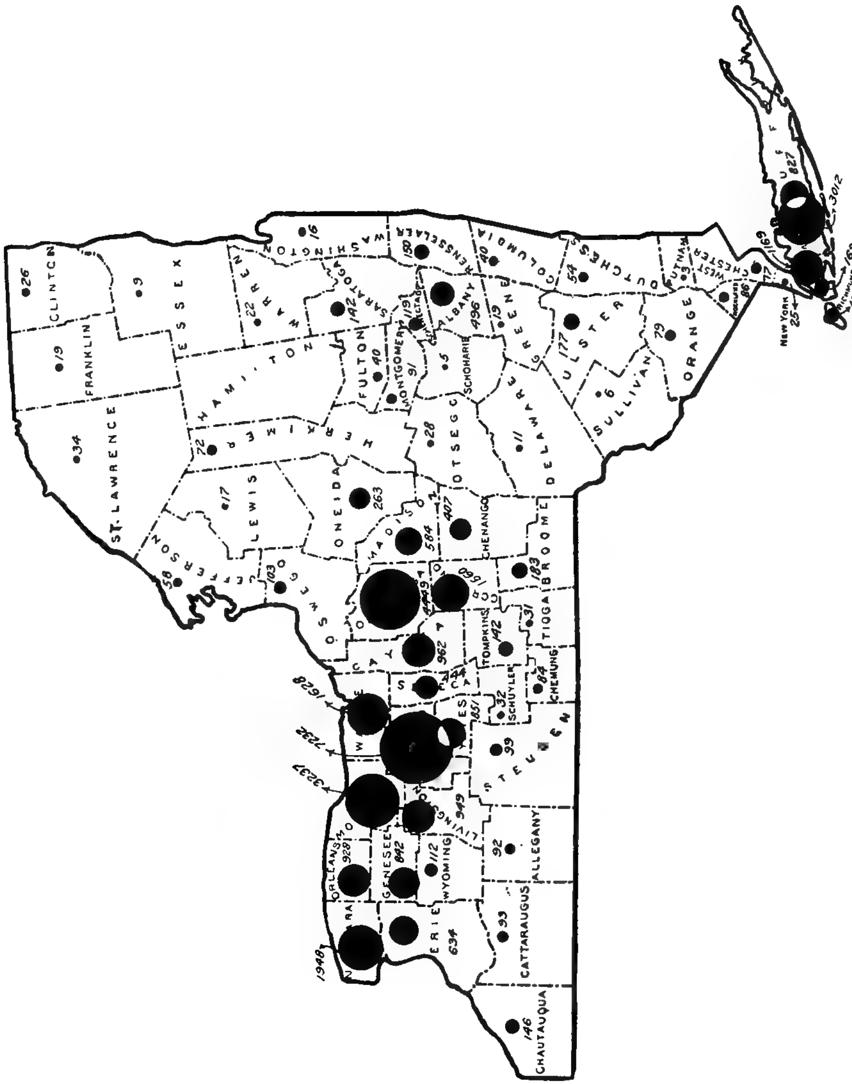

FIG. 439.— MAP SHOWING CABBAGE ACREAGE. FIGURES REPRESENT ACRES IN UNITS

ACREAGE AND VALUE OF CABBAGE GROWN IN NEW YORK STATE, BY COUNTIES

(Taken from U. S. Census, 1910)

County	*Acres*	*Value*
Albany	496	$38,744
Allegany	92	6,926
Bronx	......	....
Broome	183	14,298
Cattaraugus ..	93	8,024
Cayuga	962	67,259
Chautauqua ..	146	12,756
Chemung......	84	6,299
Chenango	407	37,483
Clinton	26	3,764
Columbia	40	3,932
Cortland	1,560	144,452
Delaware	11	1,910
Dutchess	54	5,497
Erie	634	63,917
Essex	9	1,632
Franklin	19	2,032
Fulton	40	4,242
Genesee	842	46,310
Greene	19	2,500
Hamilton	......	....
Herkimer	72	8,697
Jefferson	58	5,460
Kings	169	23,189
Lewis	17	2,360
Livingston ...	949	33,501
Madison	584	43,474
Monroe	3,237	180,978
Montgomery ..	91	10,980
Nassau	3,012	241,252
New York.....	25	1,866
Niagara	1,948	69,547
Oneida	263	31,625
Onondaga	4,449	$408,924
Ontario	7,232	265,048
Orange	79	8,227
Orleans	928	62,014
Oswego	103	8,989
Otsego	28	3,751
Putnam	3	150
Queens	1,169	154,502
Rensselaer ...	150	17,038
Richmond	136	14,185
Rockland	86	8,869
St. Lawrence..	34	5,763
Saratoga	142	12,363
Schenectady ...	119	12,461
Schoharie	5	885
Schuyler	32	1,360
Seneca	444	13,004
Steuben	99	7,510
Suffolk	827	58,414
Sullivan	6	465
Tioga	31	3,460
Tompkins	142	12,952
Ulster	177	15,732
Warren	22	3,115
Washington ...	16	2,704
Wayne	1,628	71,658
Westchester ..	77	7,744
Wyoming	112	6,645
Yates	851	23,131
The State.	35,269	$2,335,999

CUCUMBERS

C. R. White, Ionia, Ontario County, N. Y.

Farmers' Institute Lecturer

EXTENT OF THE INDUSTRY

The cucumber crop is of greater importance than is generally believed. Cucumbers are grown over a very large range of territory, thriving over the entire country. They are grown perhaps more largely for pickling than for any other purpose, but many hundreds of thousands of bushels are grown in the United States for table use; these are of a size ranging from 1¼ to 2½ inches in

Fig. 440.—Field of Cucumbers on Farm of White Farm Co.; Yield, 1914, 600 Bushels Per Acre

diameter, and are used for slicing. The over-sized ones are also in demand for frying in seasons when egg plant is scarce.

In New York State there are a number of large producing sections where both pickles and slicers are grown. On Long Island the industry is carried on very extensively, Shelter Island "cukes" being well known on the New York market. In the regions of Orchard Park and Ionia, in the western part of

the state, many thousands of bushels are grown for the slicing trade, each season.

There are numerous pickling and brining companies that annually contract for pickles, but their prices as a rule are not very remunerative, and they shift from place to place, finding new territory every few years.

Near Rochester, in the Irondequoit garden district, there are many large hothouses devoted to growing cucumbers, which is a very profitable business.

SOIL AND FERTILIZERS

The cucumber may be grown on almost any loose, well-drained soil, but it prefers the sandy or gravelly soils. It will not do well on soils that are heavy, or even on sandy soils of a silty nature,

FIG. 441.— FIVE GRADES INTO WHICH THE IONIA GROWERS' ASSOCIATION SORT THEIR CUCUMBERS

which become compact after rains. The soil should be well filled with humus and free from acidity. The black mucky loam gives good results but is usually situated on too low ground and is too subject to frosts to be very certain.

A medium application of manure is desirable when possible. For a fertilizer we would recommend one containing a goodly

amount of nitrogen derived from both nitrate and organic matter, rather high in phosphoric acid, derived from a non-acid source, such as steamed bone, and containing a small amount of potash.

Among the best crops we have ever had were those grown where green manure was plowed under and fertilized.

PLANTING AND THINNING

A number of methods of planting are practiced: six by six feet in hills, thinned to four plants; three by six thinned to two plants, and in drills six feet apart, a plant every sixteen to eighteen inches. It is largely a matter of choice which is used. However, one of the latter distance is preferred, as it gives a better distribution.

Plenty of seed should be used, as the striped bug will sometimes thin the plants considerably when small. They should not be planted until the ground is fully warm, so they will come up quickly and grow without set-backs.

The thinning should be done before the plants begin to be crowded. I prefer two thinnings: the first as soon as the second leaves are fully developed, leaving twice the number required; the second, at the last hoeing, just as they are about to fall down and run.

They should have frequent but shallow cultivation. They are injured badly by root pruning, and great care should be taken not to cultivate either too deep or too close to the plants.

TWO ENEMIES

Two cucumber enemies are the striped beetle and squash bug which, when numerous, are kept off by lime or other repellants; but they are rarely bothersome enough when a large acreage is grown to require any treatment. A more serious trouble is the bacterial blight, the only cure for which is to pull and destroy the wilted plants. Leaf blight and mildew may both be controlled by spraying with standard strength bordeaux mixture.

VARIETIES

The varieties grown for pickles are usually some one of the special cluster and picking varieties, each section having its preference.

For slicing, the white spine varieties, of which there are numerous strains, are most in use. The market prefers a variety which is green and holds its own in color well after being picked.

The hothouse growers in New York State prefer the longer varieties of the Chinese class, while those near Boston grow the Arlington white spine, which is also a favorite outdoor variety.

FIG. 442.—LOADING CUCUMBERS AT IONIA PACKING HOUSE

PICKING AND PACKAGES

In a good growing time cucumbers should be picked every two days, and should not be over two inches in diameter for best market.

The favorite package in New York State is the standard bushel basket with slat cover, and the "cukes," as they are known on the market, should be graded as to quality.

PROFITS

As for the profits, it is like many other of the vegetable crops — there is a wide fluctuation in it from year to year, the climatic conditions having a marked influence on the yield.

The market demand is also governed by the consumption of fresh cucumbers which depends largely on the temperature, many more being used in warm weather than in cool weather.

The Jewish people are the chief consumers of fresh cucumbers.

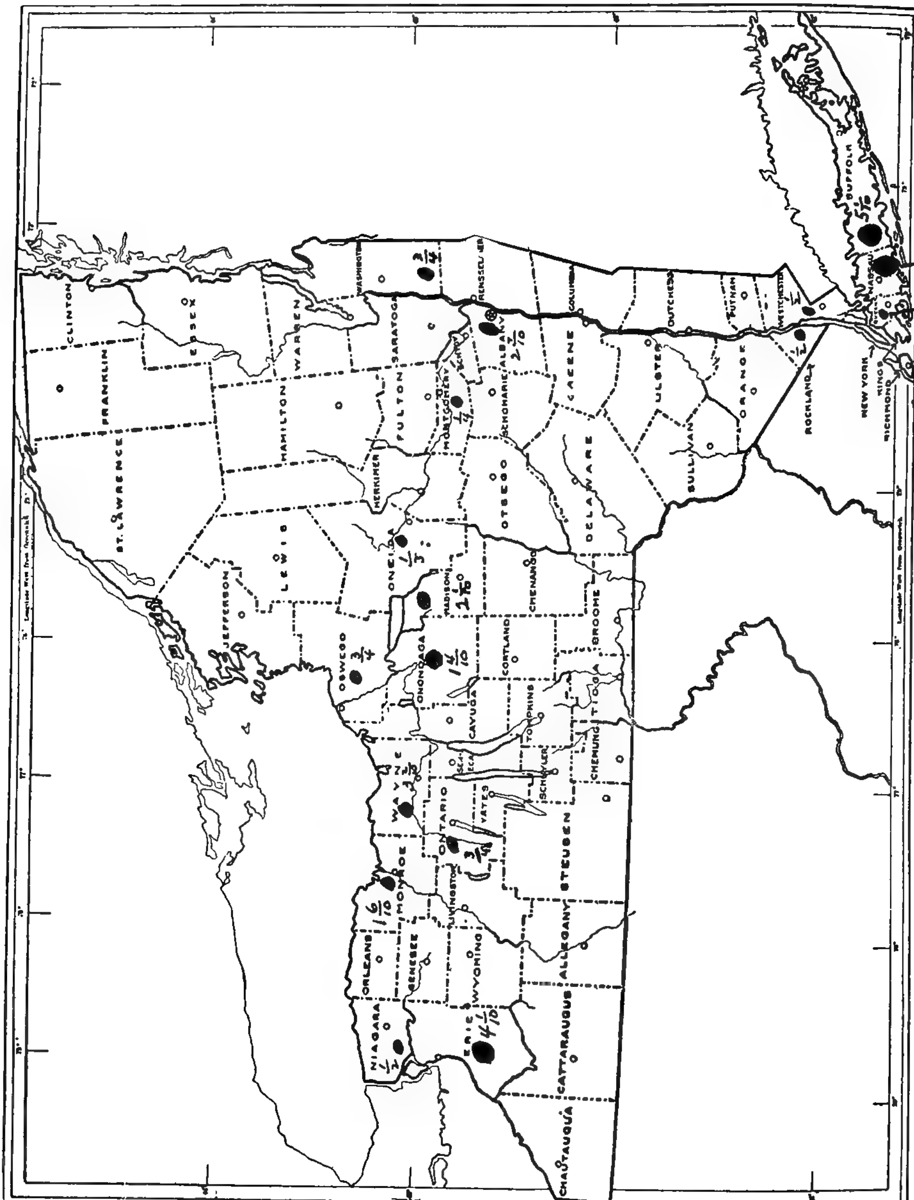

FIG. 443.—MAP SHOWING CUCUMBER ACREAGE. FIGURES IN COUNTIES

ACREAGE AND VALUE OF CUCUMBERS GROWN IN NEW YORK STATE, BY COUNTIES

(Taken from U. S. Census, 1910)

County	*Acres*	*Value*	*County*	*Acres*	*Value*
Albany	274	$18,429	Onondaga	140	$10,,307
Allegany	....	....	Ontario	64	6,053
Bronx	....	....	Orange	4	415
Broome	1	120	Orleans	3	151
Cattaraugus	3	205	Oswego	80	4,701
Cayuga	6	525	Otsego	....	....
Chautauqua	4	450	Putnam	....	....
Chemung	1	50	Queens	33	2,555
Chenango	....	....	Rensselaer	13	793
Clinton	....	....	Richmond	10	14,240
Columbia	2	350	Rockland	52	3,695
Cortland	....	....	St. Lawrence	....	....
Delaware	....	....	Saratoga	12	805
Dutchess	2	300	Schenectady	14	863
Erie	408	33,914	Schoharie	....	....
Essex	3	225	Schuyler	....	....
Franklin	2	400	Seneca	2	48
Fulton	2	330	Steuben	....	....
Genesee	3	230	Suffolk	509	84,631
Greene	1	50	Sullivan	....	....
Hamilton	....	....	Tioga	....	....
Herkimer	5	415	Tompkins	1	85
Jefferson	4	675	Ulster	5	251
Kings	5	520	Warren	2	100
Lewis	....	....	Washington	77	4,351
Livingston	1	140	Wayne	323	15,053
Madison	215	8,670	Westchester	44	4,614
Monroe	156	15,537	Wyoming	2	14
Montgomery	24	2,122	Yates	....	....
Nassau	740	92,814			
New York	14	1,385	The State	3,350	$337,841
Niagara	51	3,573			
Oneida	33	2,682			

CAULIFLOWER

A. E. Wilkinson

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Cauliflower probably was first grown in New York State in the home vegetable garden, and to a limited extent by market gardeners. About 1874 it was tried out at Peconic, Long Island, and a half acre there brought in about five hundred dollars. The following year many of the neighboring farmers tried out

(a) (b)

Fig. 444.—(a) A Cauliflower Head as It Is Likely to Develop When the Weather Is Too Hot and Dry. (b) A Typical Head of Early Cauliflower as Grown in a Favorable Season in the Corn Belt

this crop, one who tried four acres realizing net two thousand dollars. The growing of the crop soon spread to other points, particularly toward Riverhead and out towards Orient. The total acreage in the state is 1,720 acres, of which 1,498 acres are grown on Long Island, the next point of importance being Erie County. There is a vast difference between the growing of cauliflower in these two localities.

CLIMATE

Cauliflower requires for its best development a moist, cool climate, especially if tempered with the air from neighboring

bodies of water. Long Island is particularly well situated, having the sea air; and Erie County, Niagara and other counties near the Great Lakes have the advantages of these bodies of water. There are also other points in New York, especially along the Hudson, around the Finger Lakes, and near other lakes in the state, which are desirable places to grow the crop, because they meet the climatic requirements.

SOIL

The soil requirements for this crop are good drainage and a liberal, constant supply of moisture. Where moisture is deficient, the crop stops growing. Heavy loams are particularly adapted to this crop. On Long Island are found the heavy sandy loams, whereas in Erie County the gravelly and silty loams are used to grow the crop. Cauliflower is adapted to well drained muck and has met with considerable success where grown on this type of soil.

ROTATION

Rotation of crops is essential for the best results. Where club root, a disease of the roots, is common, cauliflower and other closely allied plants should be kept away from the soil for at least five years. The rotation on Long Island consists of growing a crop of potatoes or carrots preceding cauliflower and following the cauliflower with corn, rye, wheat or oats. The land may be allowed to stay down one or two years following this in clover or grass. In Erie County and other sections of the state where land is less valuable than on Long Island, a longer rotation is practiced, generally consisting of corn followed by cauliflower, then by grain, then by hay for two or three years or more. The important factor in both of these rotations should be the incorporation of humus in the soil and the avoidance of other cruciferous crops. On Long Island it would be advisable to practice a system of cover crops following potatoes and cauliflower, in order to keep the soil in better physical condition.

SEED

Most of the seed now used by cauliflower growers in New York is imported directly or through seed houses from Denmark.

Cauliflower men on Long Island, through the cauliflower exchange, import direct and sell their seed to the members of the association at a very low price.

VARIETIES

The varieties used mostly are Dwarf Erfurt and Snowball; about 90 per cent. of the latter.

In Buffalo and other sections of New York State the Snowball is the common variety used, although the Dwarf Erfurt is used to some extent. It is impossible to overemphasize the importance of good seed. Poor seed obtained from carelessly selected strains are sure to produce a loose, leafy, branching head of low value. The desired characteristic to obtain from seed should be a plant of medium to large size, producing in an ordinary season a head, the flower of which is from six to eight inches in diameter, heavy, symmetrical and solid. Dwarf Erfurt and Early Snowball will both give these characteristics, although the Erfurt makes a larger head than the Snowball under Long Island conditions.

The amount of seed necessary to plant an acre varies according to the care of the seed bed, number of plants required per acre, whether conditions and many other factors. An ounce of seed may ordinarily produce 2,500 to 3,000 plants, although the ounce may really contain over 10,000 seeds. On an average about 6,000 plants are required per acre. It would, therefore, require about two to two and one-half ounces of seed to plant an acre. Generally speaking, in planting it is best to allowed three ounces per acre, in order to be sure that enough plants will be available. The seed of cauliflower does not deteriorate quickly. It has been found that it is as good at two years or three years of age as at one, although a little thicker sowing is advisable with three-year-old seed. Beyond this point, the germinating power begins to decline rapidly.

RAISING EARLY PLANTS

In order to obtain an early product, it would be necessary to start the seed of cauliflower similar to the way in which early cabbage is produced. It is necessary, however, to exercise great care in the growing of early cauliflower plants. This increased

care consists of having a soil which is only medium as to richness, not over watered, and freely ventilated. It is desirable not to hasten the growth of plants, but to produce a healthy, unchecked, moderate growth. The early seed is sown about March first. The seedlings should then be ready for the field May first to tenth. Cauliflower plants are more tender than cabbage, and, therefore, they cannot be placed outside until danger of hard frost has passed. Some growers practice the method of transplanting when the seedlings are very small, placing them two by two or two by three inches apart in beds or in flats. This extra space will provide free circulation of air. Cauliflower plants may be transplanted into paper pots, dirt bands, or other receptacles, and a much larger plant grown in this way; also seed may be sown a trifle earlier.

RAISING LATE PLANTS

It is customary to prepare a seed bed on the edge of the field similar to that for growing cabbage plants. The method has but one advantage, and that is, it is handy. It is much better to select a portion of land of greater value for the growing of the crop, particularly a piece of land that is not infected with disease, or if infected, that could be sterilized; also a portion of land that could be protected and that is near water. The land is generally plowed early and worked up very fine and level. The system on Long Island is that of using the planker followed by the Acme harrow, then the planker, then the Acme harrow. Some men instead of using an Acme harrow use a Meeker harrow. The numerous small discs on this harrow make it an excellent tool to finish the bed.

Fertilizer is then applied to the bed, the amount varying. Some men advise a 6–8–5 at the rate of a ton to the acre, others a 5–8–8 or 4–8–8, from one-half ton to a ton to the acre. From recent experiments tried out on Long Island, it seems that adequate returns can be obtained from 1,000 pounds of a 4–8–10 fertilizer, thus saving half the fertilizer where a ton has been used, and the seed is generally drilled in with a hand drill, the rows being spaced one foot apart. Two methods are practiced, one with two rows planted two feet apart and then two feet

between the next pair of rows, and another method which requires a solid bed of rows one foot apart. There seems to be very little difference in the plants produced. There is a variation in the amount of seed to be used per rod, the difference varying from an ounce of seed to five rods, to an ounce of seed to ten or twelve rods. Some men advise the use of one ounce of seed to 200 feet of drill. Where a large distance is given between plants, the plants grow short and stocky and have leaves which are in the way when using the planker. When brought very close together, the plants are spindly and weak, and not desirable. So the best distance for planting seems to be an ounce of seed to about ten rods.

The depth of sowing should be carefully regulated, from one-third to one-half inch being deep enough. In order to prevent crusting or baking of the soil over the seed, thus hindering its coming up, fine sand should be strewn along the row. If this sand is dry, it will resist all attempt to bake. It takes from six to eight weeks to grow plants of suitable size for transplanting. Generally this is about one week longer than for growing cabbages. The time of sowing the seed varies from the first of May to the middle of June. Where a late crop is desirable, even later plantings may be made.

It is quite advisable to make more than one sowing, because it offers an opportunity to choose the most favorable time for transplanting. It also aids in forming a succession in the harvest, thus helping in a better distribution of labor. Clean culture is necessary during the growing period of the plants, the soil being cultivated lightly two to five times to prevent crusting. If weeds develop in the row, it is best to remove them. At the time of transplanting, the plants should cover the bed with a growth from six to eight inches high. The growth should be firm and stocky — a sappy, weak growth is not desirable. Careful watch should be kept for insects or diseases in the seed bed and suitable remedies applied at this time.

TRANSPLANTING

The land used for transplanting should have been plowed early. In some cases on Lond Island a crop of early potatoes is grown

first, followed by the crop of cauliflower. If this method is practiced, the land is worked very heavily throughout the season, and there seems to be no opportunity for a cover crop. In western New York the general method is to devote the land to the one crop during the season. The soil should be very finely prepared in order to facilitate transplanting. The best time to transplant is in cloudy or rainy weather, and if possible, more than one transplanting should be made. This will aid in lengthening the period of harvesting and in distributing labor. If a sunny day is selected for transplanting, the plants should be set only during the latter part of the afternoon.

On a large area machine planting is the system in vogue. With smaller areas hand planters are used. The machines greatly reduce the amount of hand labor and make the work more rapid. The stand is less perfect than with hand planting, and it is quite necessary to go over the patch by hand and reset. One or two hand planters on the market at the present time, according to figures, reduce the cost of planting, and in comparison with the method used, give better satisfaction than horse-drawn machines, especially on areas of five acres or less. On the large machines drawn by two horses, a barrel of water is carried, and at each click of the machine a half pint of water is delivered in the furrow. The clicking of the machine denotes the location of the plant, and the droppers, who are on the rear of the machine close to the ground, should place a plant at this time. Sometimes the water is allowed to run continuously because there is a variation in the placing of the plants. For the most successful work with the machine, the ground should be fairly dry. If the soil is wet, the machine does not work as well.

If hand planting is used, it is possible to mark out the field in two ways and place the plants at the intersection of the marks. The distance between rows should be three feet and the distance between plants in the row from eighteen to thirty inches. Plants set by hand can be cultivated both ways. Where the plants are located three feet apart between rows and thirty inches between

plants in the row, it requires 5,808 plants for an acre. With machine planting, generally more than 6,000 plants are used.

Whether the setting is done by hand or by machine, the plants should be obtained in the following manner:

Loosen the soil about the plants on both sides with a fork. Slightly lift the plants from the ground, being careful to retain as much of the root surface as possible. Shake them dry. Dip the roots in a pail of thick water made up of heavy soil and water. This process is known as puddling. Place the plants in boxes, roots down. If they are not running relatively even as to size, it may be best to select at this time, saving work on the planter. The best crops are obtained where plants are selected. If the leaf surfaces are too large, it is a good plan to twist or cut them off slightly. They may be carried to the field in these boxes and distributed at convenient points.

FERTILIZERS

The amount of fertilizer varies with the system of farming. On Long Island where the soils are deficient in humus, a larger amount of fertilizer is used than at Buffalo. The Long Island men are now employing fertilizer to the exclusion of stable manures, in many cases much to their disadvantage. The successful growing of cover crops combined with fertilizer might take the place of barnyard manure, but where poor cover crops are grown, success is not forthcoming. At Buffalo the fertilizer used is generally a 4–8–10 or a 3–8–6, using from 750 to 1,500 pounds per acre. On Long Island the fertilizer used is generally a 6–8–5, although 5–9–6 and other formulas are in use. The amount used on Long Island is much larger than that used near Buffalo, generally from 1,500 to 2,500 pounds per acre being applied. The fertilizer is made up as follows: one-half the nitrogen is derived from nitrate of soda, one-half from fish scrap; acid phosphate from South Carolina rock, and in some cases when fish scrap is not obtainable, from tankage, which is substituted for fish scrap; the potash is generally in the form of muriate.

The Long Island men, being organized, are able to obtain good fertilizers at a much smaller price. In one or two sections of

western New York the same advantage is obtainable, because the men are realizing more and more that it is greatly to their advantage to organize.

Sometimes further applications of fertilizer are furnished. Bone meal, 300 to 400 pounds per acre, is often used; and one or two applications of nitrate of soda, 100 to 150 pounds at each application, are found valuable.

The method of applying the fertilizer varies, some men claiming that the best method is broadcasting, while others claim it should be applied in the row. Where cover crops and intense, up-to-date systems of farming are practiced, it may be desirable to place the fertilizer in the row. If the opposite is the rule, broadcasting should give better returns.

CULTIVATION

Cauliflower is a shallow-rooted crop, therefore cultivation should not be deep. It should commence as soon as the plants are set and be repeated very often. It is highly important that the plant does not suffer from drouth. Cultivation should continue as long as it is possible to get through the field.

TYING

It is necessary to protect the head or flower from exposure to sunlight. A perfect head of cauliflower should be dazzling white. Sometimes but a day or two of exposure will cause the head to become brown or purple. At first the leaves protect the head, especially when the flower is small. However, when the flower has developed to the size of a teacup, the leaves are pushed aside. Then artificial means of covering become necessary. The most common method of tying the heads is that of gathering the leaves together over the top of the head and tying with a piece of string, raffia or straw. It seems best to use different materials for tying, in order to distinguish between the different periods of tying. If on the first tying straw was used, the next time string should be employed, and the next time probably folding the leaves over the head and twisting the leaves from opposite sides, in order to hold these leaves in place, might be practiced. The grower will then know just which to cut first.

The length of time necessary for development of the head after it has been tied depends mainly upon the weather conditions, but it also depends on how well the factors in growing the crop have been carried out. If the field has lacked cultivation, do not expect the heads to grow very rapidly unless rains are frequent. Where conditions are correct, it has been found that in the hotter part of the season, two or three days will be sufficient. In the cooler days of autumn it will require from eight to twelve days to develop the head. Heads should be watched carefully, and when they become six to eight inches in diameter, should be cut. If left too long in warm weather, the leaves decay and discolor the head. In cold weather the heads begin to push up from the flower stalk, becoming undesirable, because they are irregular.

CUTTING AND TRIMMING

In cutting, it is seldom necessary to examine more than an occasional head for plants of any particular day's tying, because the plants of that tying will be ready about the same time. If, however, there seems to be an unevenness in their development, it will then be necessary to pry open the leaves of every head.

Cutting may be conveniently performed with a large butcher knife or hunting knife. The instrument will also serve for trimming. When the heads are to be cut, it should be done very carefully. They are seldom trimmed in the field, but are merely severed several inches below the flower and removed, leaves and all, to a packing house, where they are dressed and packed. It is necessary in cutting to have quite a portion of the stem and also of the large leaves remain with the flower, because in trimming the leaves are severed even with the sides of the flower and in such a manner that the whiteness of the flower is set off by the green frings. The leaves also serve as a protection. Where shipment of long cut flowers is practiced, the leaves are cut three to four inches above the flower, thus protecting the head efficiently.

There are three different types of trimming, the long and the short trim, both previously mentioned, and a medium between these two. The long trim is especially suited to distant shipments, protecting the snow-white heads from bruises, therefore disfigurement. It also enables the retailer to retrim the head

and place it before the customer in a very desirable manner. The great disadvantage is the lessened number in a barrel or box and the heavier weight. The medium trim leaves the tops of the leaves just flush with the crown. It is particularly adapted for short journeys. There are more heads in each barrel. Short trim heads are generally covered with a small piece of paper to protect them. They are packed in a much better package than the other types, and return a higher price on the market.

PACKING

The common practice on Long Island has been to use a second-hand barrel, generally the sweet potato and the spinach barrel shipped from the South. These are unattractive, often dirty, unsanitary receptacles, and have lost favor on the market. Buffalo growers, by using a small, sanitary, attractive crate, have forced the Long Island men to adopt the same measures in order to continue shipping cauliflower to the same market. The packing of cauliflower in barrels consists of laying the heads right side up and as snugly as possible in the barrel, making the butts of each successive layer rest between the heads of the preceding. Another method consists of placing the heads out towards the sides of the barrel and inserting other heads in the middle. Generally from twenty to twenty-four heads of long-cut flowers fill a barrel. The barrel is crowned up eight inches above the top. It is then covered with a piece of burlap, often a piece of fertilizer bagging. Short-cut flowers packed in barrels require from thirty to thirty-five heads, and the medium from twenty-five to thirty. The barrel that sells the best on the New York market has been one containing about twenty-five heads.

The most satisfactory crate used has been one holding just twelve heads. A row through the middle of the crate accommodates four heads, flowers down, and on each side of this a row of flowers heads up. A slat is preferred and one which can be inspected easily by the association. A very desirable box is used by the Erie County Growers' and Shippers' Association, which consists of a slat crate with slanting sides holding from nine to twelve flowers, according to the size. The crate costs about fourteen

cents. It is strong enough to prevent injury by expressmen or other rough handling; it will protect the flowers perfectly, and it is open enough to allow the inspectors employed by the association to thoroughly inspect each package.

One of the great advantages of using the crates is that of forcing the growers to grade their flowers according to size. With the barrel, grading is very seldom practiced.

MARKETING

The cauliflower crop from Long Island is moved by fast freight, the railroad often providing special trains. These special trains are put on whenever the shipments are large. A large amount of the shipment, especially to distant markets, is made in refrigerator cars. The train leaves the east end of the island in the morning and arrives at Flatbush between six and seven in the evening. The barrels are then trucked to the consignee at New York City and go on sale early in the morning. The largest day's shipment known to the writer has been 10,000 barrels. A car holds between 200 and 300 barrels, which are loaded on their sides in the car.

Most of the flowers from Long Island are sold on commission through the association, or are purchased outright. At Riverhead, the head office of the association, drivers come in with their wagons, drive up to a platform, the auctioneer removes one or two barrels from the load, taking out the contents, and the load is sold on the contents of those barrels. The auctioneer asks for bids, and representatives of commission houses or the manager of the exchange bid on the barrels. If the price is too low, the manager raises the bids until they are sufficiently high, in this way assuring a fair price to the grower.

In western New York the flowers are sold through the association, the association shipping to various cities according to orders, or wherever the manager thinks advisable. In some of the other sections of New York the cauliflower is carried on the market in open trays or crates and sold directly by the individual head, the dozen, or the load, the flowers going to individuals, hotels, restaurants, stores and other places.

YIELDS, PRICES AND PROFITS

The expenses per acre of growing the crop, according to the figures obtained by Cornell University, are as follows:

	Moderate	Liberal
Rent of land ($175–$200 per acre)......	$15 00	$15 00
Plowing and harrowing................	2 00	3 00
Seed, 2–3 oz.........................	2 00	3 00
Seed-bed (labor and fertilizer)..........	2 00	2 50
Marking field and applying fertilizer.....	2 00	2 50
Fertilizer (1,500–2,000 lbs.)...........	22 50	30 00
Setting out plants.....................	2 50	3 50
Cultivation (about six times)...........	4 00	5 00
Interests and depreciation on tools......	2 00	6 00
Tying and harvesting..................	20 00	25 00
Packing, barrels, papers, nails and covers.	20 00	30 00
Hauling to station....................	2 00	4 00
Total	$96 00	$129 50

The average yield per acre varies greatly according to the conditions. An average from thirty-four acres on Long Island was 111½ barrels per acre. Some of the high reports are 200 barrels, and from this it varies down to a very low yield. Good growers expect to get about 150 barrels to the acre in an average season.

The price of cauliflower varies widely, depending upon the size of the crop and the demands of the market. The early summer cauliflower generally brings from $3.50 to $4, falling from that to as low as 50 to 60 cents per barrel. The average price for cauliflower in crates in western New York was 72½ cents, about eleven heads in each crate. An average price from a great many growers on Long Island for several years has been from 85 to 90 cents per barrel. The average yield, taking the figures given previously, would return about $100 per acre.

It is safe to say in an average year, with a good fall, that a price of $200 per acre is about the amount which should be returned.

INSECTS

The cauliflower is troubled with several insects. The imported cabbage worm is one of the common pests. It eats large, irregular holes out of the leaves, generally working on the upper surface. It is readily reached by dust or spray. The cabbage looper, obtaining its name from the particular habit with which it moves, eats both on the upper side and the lower side of the leaves. The diamond back moth is a small caterpillar which works on the underside of the leaf only and does not eat through. It is very difficult to control this pest because of its habits.

These leaf-eating insects are generally controlled by applications of spray material. The imported cabbage worm is best controlled by spraying with arsenate of lead early in the season, and later, when the heads have formed, with such remedies as pyrethrum or hellebore. Hot water at a temperature of 130 degrees F. will also kill every worm that is reached without injuring the plant. The looper is most satisfactorily destroyed by dry poisons. A pound of paris green mixed with a pound of flour is sufficient to dust an acre, sifted on the plants early in the morning when they are wet with dew. The diamond back moth can be controlled by the use of an elbow extension rod or an angle nozzle to spray the under sides of the leaves with arsenate of lead, six pounds to one hundred gallons of water.

Cabbage aphis or louse are common pests, appearing generally in the seed bed. If not controlled, they multiply rapidly on the older plants. They may be controlled with nicotine solution applied to the plant, beginning early in the season. Whale oil soap is also a good remedy, one pound to six or seven gallons of water.

Cabbage maggot is often found on the crop. In the seed bed it may be controlled by covering the bed with cheesecloth, keeping out the fly that lays the egg which produces the maggot. In the field we have no well tried remedy to control this pest. A new one just recommended is one-fifth ounce white arsenic dissolved in one gallon boiling water, and one pint cheap molasses. Spray on the leaves in large drops. The fly is attracted to this remedy and is killed by eating it.

DISEASES

Club root. This is a common disease in western New York and is becoming more common on Long Island. It is a swelling of the root caused by low organisms known as slime molds. The disease receives its name from the club-like appearance of the root system. Infection takes place through the root, and the organisms are able to live in the soil. The remedy is rotation of crops, keeping all closely allied crops away from the land for at least five years, and applying lime to the soil once every two or three years, or at longer periods. Care should be exercised not to bring the disease from the seed bed. Fields are soon rendered worthless in this manner.

Black rot. This is a common disease of the cabbage which is very destructive to cauliflower. Infection generally takes place through wounds, slowly working through the veins and involving the whole plant. The growth of the disease is marked by a yellowing or browning of the leaf from the tip backward and a darkening of the fibro-vascular bundles. The best remedy seems to be rotation.

Soft or stump rot. A common disease in seasons of hot and muggy weather. A wounded portion of the plant offers an opening for this parasite. The stem and inside of the head generally rots first. Rotation and liming the soil seems to be the best remedy.

Physiological trouble. Ricing is a physiological trouble probably resulting from renewed growth or pushing up of the flower heads, frequently caused by rain after a long period of drouth, especially where the plants have been standing still. Cultivation seems to be a good method of controlling this trouble. Additions of humus-making material to soil will also aid materially in increasing its water-holding capacity, thus helping to do away with the trouble. Bad seed selection may be another cause.

PICKLING

Cauliflowers are often grown for the pickle factory. There seems to be no difference in the culture from that mentioned for market, with the exception of harvesting. The flowers in harvesting are removed from the plant and the leaves taken from them.

The coral-like substance is the only portion sold. The yield per acre of flowers for pickling varies from three to ten tons. A good average yield is about five tons per acre. Many growers of market cauliflower have an opportunity of selling their rice heads, extra large heads, or over-supply during years of heavy production, to the pickling stations; thus realizing more from their crop than they otherwise would.

GROWING CAULIFLOWER UNDER GLASS

Cauliflower is grown under glass, particularly at Mattituck, Long Island, in the fall of the year. The plants are placed in the greenhouse early in the fall and given the same attention as that mentioned for outside with the exception that more care is exercised regarding the moisture conditions. The flowers are not allowed to produce as large heads as those grown outside. They should be produced about Christmas time and from then on until the first of February. At this time small heads are sold at from fifteen to twenty-five cents apiece.

It is particularly valuable as a fall crop with greenhouse vegetable men who are growing cucumbers and tomatoes as a spring crop. The only competition of this crop at the particular time of year is from flowers grown in New Orleans and California.

The time necessary to produce heads from seeds in the greenhouse varies from ninety to one hundred twenty days. A house 50 feet wide and 320 feet long will accommodate about 2,700 cauliflower plants. At the same time lettuce plants may be interplanted and it will accommodate three times as many of these.

From eighty-five to ninety per cent. of all the cauliflower plants should form heads under proper management. Some very high yields of flowers have been mentioned from various men engaged in this line of work. The first quality heads sell at from fifteen to twenty-five cents a head, the second quality at from ten to twenty cents and the third from five to fifteen cents. The fuel cost for growing the crop should not exceed $60 to $75; the care of the house should be about the same as for lettuce or other cool greenhouse crops; the cost of seed about $6 to $8; insurance $20; miscellaneous about $75 — total, $221 to $253.

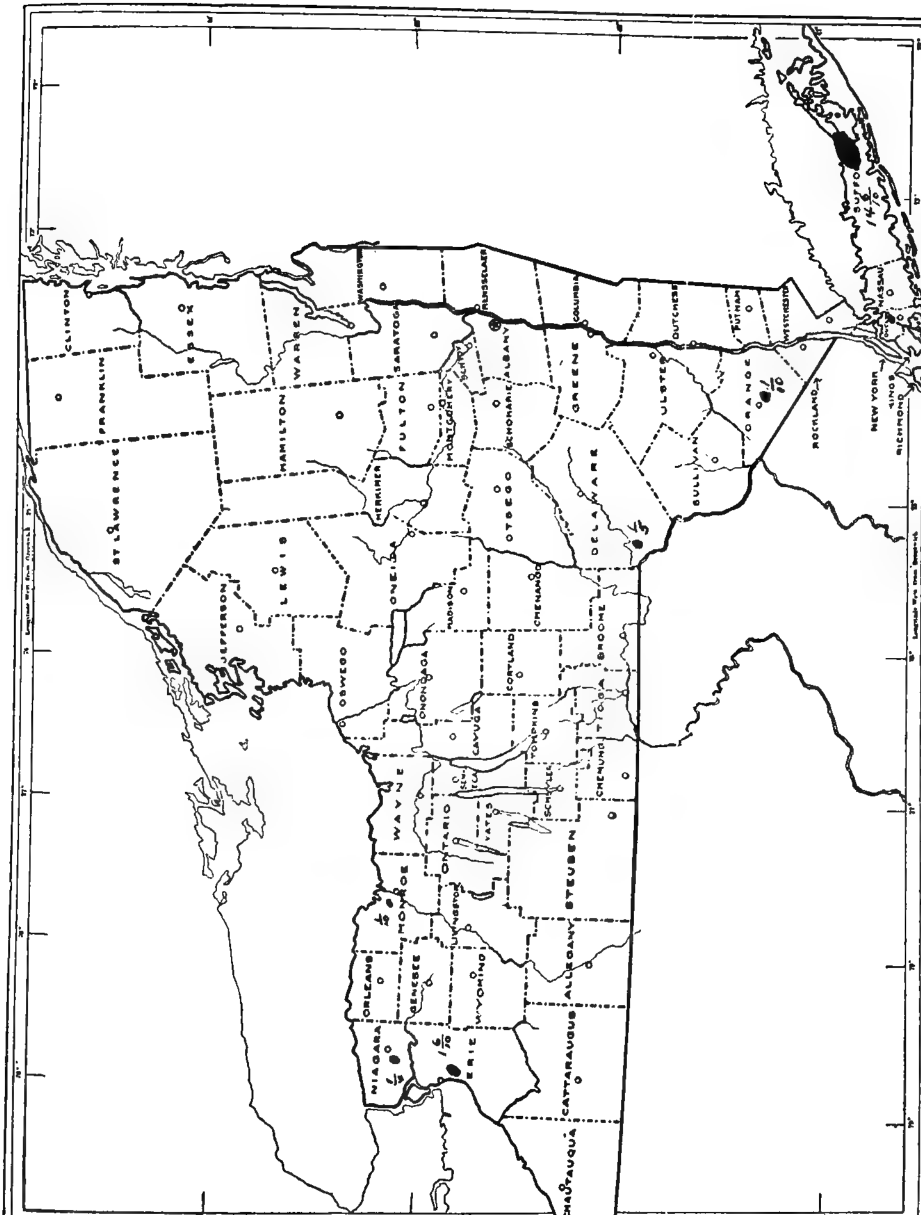

FIG. 445.—MAP SHOWING CAULIFLOWER ACREAGE. FIGURES IN COUNTIES

ACREAGE AND VALUE OF CAULIFLOWER GROWN IN NEW YORK STATE, BY COUNTIES

(Taken from U. S. Census, 1910)

County	*Acres*	*Value*	*County*	*Acres*	*Value*
Albany	2	$140	Oneida	2	$500
Allegany	....	....	Onondaga	3	800
Bronx	....	....	Ontario	....	....
Broome	1	100	Orange	10	1,300
Cattaraugus	....	....	Orleans	....	....
Cayuga	....	....	Oswego	1	75
Chautauqua	....	....	Otsego	....	....
Chemung	2	90	Putnam	....	....
Chenango	....	....	Queens	31	4,570
Clinton	....	....	Rensselaer	....	....
Columbia	1	300	Richmond	....	....
Cortland	....	....	Rockland	1	200
Delaware	18	7,170	St. Lawrence	....	....
Dutchess	3	300	Saratoga	....	....
Erie	158	26,723	Schenectady	....	....
Essex	....	....	Schoharie	....	....
Franklin	1	90	Schuyler	....	....
Fulton	1	125	Seneca	....	....
Genesee	....	....	Steuben	....	....
Greene	....	....	Suffolk	1,462	285,742
Hamilton	....	....	Sullivan	....	....
Herkimer	....	....	Tioga	....	....
Jefferson	....	....	Tompkins	....	....
Kings	3	1,800	Ulster	....	....
Lewis	....	....	Warren	....	....
Livingston	....	....	Washington	....	....
Madison	....	....	Wayne	....	....
Monroe	9	1,583	Westchester	....	....
Montgomery	....	....	Wyoming	....	....
Nassau	2	880	Yates	....	....
New York	....	....			
Niagara	9	1,320	The State	1,720	$338,808

BRUSSELS SPROUTS *

Brussels sprouts are grown throughout the eastern end of Long Island, covering much the same section as cauliflower; but the industry is centered about Orient, at the extreme end of the Island. Cauliflower was once largely planted near Orient, and the soil appears to be quite as well adapted to the crop as farther west; but it has proved impossible, perhaps because of fogs, to grow as good cauliflowers here as about Southold and to the west, hence the growers have abandoned this crop for sprouts. Equally good sprouts can be raised west of Southold, but cauliflowers are deemed more profitable, and the industry is better organized.

Sprouts are grown on the same soils and sites as cauliflower, and for discussion of these topics the reader is referred to the preceding article on Cauliflower.

HISTORY

The first sprout seed sown in Orient was brought there by Captain Smith Dewey, a commission man who was a regular buyer at the east end of the Island, from New York in 1876. He secured an ounce of seed imported from Belgium by Mr. W. G. Ihrig, a New York commission man, and divided it equally between Mr. George W. Hallock and Mr. John Henry Youngs. Mr. Hallock discontinued the crop after one year, but Mr. Youngs has grown it uninterruptedly to the present time, though continuous and careful selection has so improved the stock that it now has little resemblance to the original.

The plants first raised were about three feet in height, or nearly twice that of the present strain, and had larger, though very firm, sprouts. It was customary in the early days to plant sprouts early, and this no doubt partly accounts for the difference in height.

Brussels sprouts were all but unknown on the New York market in the seventies, and Mr. Ihrig, who handled the slender Long Island product, found it slow work to build up a trade in them. Among his best customers in those days were Tom Thumb and his wife of Barnum's Museum, at Ann Street and Broadway,

* Reprint from Cornell Experiment Station Bulletin No. 292.

and Mr. Ihrig soon began to call the sprouts " Tom Thumb cabbages," and sell them to clubs and hotels under this name. About 1880 three barrels shipped in midwinter by Mr. Youngs of Orient were promptly sold by Mr. Ihrig, who sent back a check for sixty dollars.

The region about Orient continues to be one of the most important sources of supply of this vegetable for the New York market, the crop now amounting annually to something like 300,000 quarts. The area planted each year is approximately 125 acres.

PREPARING THE SOIL. ROTATION OF CROPS

The preparation of soil and rotation of crops already described for cauliflowers applies equally well to Brussels sprouts. Late sprouts are grown as a succession crop following potatoes, or occasionally early carrots; for early sprouts the land is plowed in May and kept harrowed until time for setting the plants on new land. Sprouts are occasionally grown two years in succession but commonly three or four years are allowed to intervene between crops. No cruciferous crops, such as turnips, should be grown on the land meantime, as these serve as hosts for the club-root. Sprouts are commonly followed by potatoes, but frequently by corn or carrots; some then seed down to grass and so return to potatoes and sprouts. Some persons grow potatoes every year in the intervals between successive crops of sprouts.

Cover crops are commonly employed on the sprout fields. One of the leading growers finds timothy most satisfactory, broadcasting it in August over cucumbers or other late crops. The seed lodging on the leaves is washed into the soil by the first rain, and by winter the ground is well carpeted. Even if the top-growth is small, and the amount of vegetable matter appears trifling, when the land is turned over the soil near the surface is found to be densely filled with fine roots, and the texture of the soil greatly benefited. Another good grower will sow oats in August after potatoes, spread with ' bunkers ' (mossbunkers or menhaden) during the fall, plow under and sow to rye for a winter cover. The next May the rye, then twelve to eighteen inches high, is plowed under and the land kept clean by harrowing till late June, when early sprouts are set. In the fall rye is sometimes sown among the sprouts, but the ground is then rather densely shaded to permit

RAISING THE PLANTS

The seed used at Orient is all locally grown, those who do not produce their own supply procuring it from their neighbors. The strain is very fine; its origin and characteristics are described later in the section on seed-growing. The seed bed is prepared on one edge of the field, the land it occupies being plowed and set with plants as soon as the rest of the field is finished. After the plot is made fine, and fertilized as for the crop, the seed is put in with a hand drill in rows eighteen to twenty-two inches apart, to make horse-cultivation possible. It is not wise to crowd the plants as much as with cauliflower, since any shedding of the lower leaves means loss in the early crop, as a sprout forms in each leaf-axil. With such spacing no hand-weeding is done; the weeds which grow in the rows are lifted with the plants and rejected as the latter are sorted.

Allow four ounces of seed per acre, and five weeks from seeding to produce plants of the proper size for setting. The sowing for the early crop is made from May 10 to 15, bringing the setting about June 20; and for the late crop from June 15 to as late as July 10. Three sowings are frequently made by the same grower at intervals of two weeks. The plants at the time of setting should be six to eight inches high, and stocky.

SETTING OUT THE PLANTS

For the early crop plants are set out in the latter part of June or early July, and for the late from July 20 to August 15, most of them going out about the first of August. Planting by machine has been tried by a number of growers, but practically all have fallen back on planting by hand as more reliable and giving better results. The machine would succeed under the proper conditions, but these it seems impracticable to meet. That is, when sprouts follow early potatoes the ground is very dry at setting time, and needs more thorough wetting than the machine affords. Then, too, to succeed with a machine one needs a heavy, slow and steady team, a skillful driver, and two careful and accurate men to ride behind.

The ground is marked in checks 3 x 2½ feet, or less commonly 3 x 3, or 3 x 1½ feet. The latter distance is too close. At the

first named distance 5,808 plants are required for an acre. The holes are made with a hoe and soaked with water, and the mud is plastered over the roots in the same way as already described for cauliflowers. Twenty barrels of water an acre are required for setting in a dry time.

FERTILIZATION AND CULTIVATION

A commercial fertilizer is always used on sprouts, though when the latter succeed potatoes the same year the fertilizer is applied to the potatoes. If the land has been spread with bunkers the preceding fall, one-half ton of 4–8–7 fertilizer is sufficient on the potatoes; otherwise 1,500 to 2,000 pounds should be used. If the land is saved for sprouts, the same amounts of the 4–8–7 or of the 6–8–5 are used just before setting. One grower obtained one of his best crops when he used three-fifths of a ton of Lister's potato fertilizer and one-half ton of fish scrap, on land saved for the crop. The land was in sod the preceding year. The I. P. Thomas potato fertilizer, at one to one and one-fourth tons per acre, is also liked for sprouts. Every other year the land should have a spreading of stable manure at the rate of 100 to 150 dump-loads (16 to 24 tons) per acre.

Bunkers when obtainable cost $1.50 a thousand. They do not become so quickly available as fish scrap, but the blood and juices go into the soil, and the fertilizing materials come considerably cheaper in this form. It takes about 14,000 bunkers to make a ton of fish scrap analyzing 10 per cent. ammonia and 6 per cent. phosphoric acid, yet the scrap sells for $35 a ton,

Swamp muck from the salt marshes is being used on sprout ground by one grower at the rate of ten spreader-loads per acre. It is dug with a steam shovel, sprinkled with ground phosphate rock, and shredded by running through a rotary ice chopper. The material, which is black as coal, consists of a mass of fine roots and ought greatly to increase the retentiveness of the soil; but it has not been in use long enough to demonstrate its value. A sample shows the following analysis:

	Per cent.
Water	6.9
Organic matter	45.49
Nitrogen	1.27

	Per cent.
Phosphoric acid (P_2O_5)	.079
Potash (K_2O)	.586
Calcium oxid	.703
Chlorine	5.53

Shallow cultivation should be given after rains and about once a week in dry weather.

IRRIGATION

Irrigation of sprouts is being tried this year for the first time at the eastern end by Mr. L. H. Hallock of Orient. About an acre of sprouts are being watered by the Skinner system of overhead pipes set with tiny nozzles. The runs of pipe are 800 feet long and 50 feet apart, supported on pipe columns about 6½ feet high. A space 25 feet wide on either side of the pipe can easily be watered by this arrangement. The plants under irrigation were set out about August 15, following early carrots. They were well watered as soon as set, and have had waterings every week since, except when it rained. The water was allowed to run about five hours each time, amounting to half an inch. This sort of irrigation also has the advantage of knocking the lice off the plants.

HARVESTING

Harvesting begins as early as the middle of September from the plants set in June, but the shipments are light until well into October. Early sprouts should be picked over two or three times in the field, the lowest sprouts being taken each time, otherwise these will open out and become yellow, or rot if the weather is warm. The first picking must be done when the outer leaves of the lowest sprouts begin to turn yellow. In picking, the leaf subtending the sprout is broken away, so that when the time comes for cutting the plants the early ones will show from several inches to a foot of bare stem. As these lower leaves and sprouts are removed the plant continues to push up and form new leaves at the top, and the upper sprouts also fill out better, so that the yield of sprouts at the final cutting is about as great as though no picking had been done. When a sprout is ready to pick it readily breaks away from the stump; otherwise it clings tenaciously. These early

sprouts are picked into bags and carried to the packing house or "sprout house," where they are packed in berry-boxes in the manner described in a following paragraph.

As freezing weather sets in, usually early in December, the plants are cut off near the ground with a corn hoe and hauled to some convenient place near the packing shed for stacking. A somewhat sheltered place, as an orchard, makes an excellent stacking ground, for the cold winds of winter are more likely to injure the sprouts than mere frost. The plants are stood upright on the ground as close together as possible, and a light covering of seaweed placed over them. A few inches of this material affords admirable protection, for it is too porous to cause heating, yet an excellent insulator. It should be dry when used. A covering of soil is much too heating. Freezing does not injure the sprouts if they are thawed gradually before handling, as in a cellar, but alternate freezing and thawing spoils them. A few growers trim off some of the lower leaves before hauling from the field, but most of them put the plants in the stack without trimming. The stacks are only one layer deep, and are commonly made about a rod wide, and as long as required.

After the plants are stacked the sprouts may be picked at leisure through the winter, adjusting the work to the markets and the steady employment of labor. The packing houses are provided with heat and light; when other tasks fill the day the picking is often done at night, from half past five to ten or eleven o'clock. Early sprouts especially are packed at night, the day being consumed in picking them. Upon being removed from the stack, the plants are divested of leaves and tops, and merely the stumps with sprouts attached are brought to the house. The pickers sit at a table with sprouts and berryboxes before them. The sprouts are removed from the stump with a small knife, such knives as paring, budding, shoemakers' and jackknives being variously employed for this purpose. It is usually necessary to cut through the leaf-base in order to sever a sprout. The stumps are found to be good feed for stock, and are largely employed for that purpose. The sprouts having been removed from the stump, they are "shucked" or freed from the outer dry or yellow leaves, and placed in quart

berry baskets, the looser heads going into the bottom, and the smooth, firm ones on top, allowing a crown of an inch or two above the rim of the box. Little attempt is made at sizing, but occasionally the small hard sprouts are packed by themselves.

In the earlier part of the season, when the sprouts run larger and with fewer culls, the common price paid for picking and packing is two cents a quart; and at that rate a man working an evening from 5:30 to 11:00 can sometimes make $1.25. If the sprouts were poor he could not make over two-thirds of this amount. In the winter the pickers often insist on being paid by the day, the common rate being one dollar, but a good picker can usually do better at piece-work, for he can average two bushels or sixty-four quarts a day.

When the boxes are packed they are set in 32-, 48-, or 60-quart crates for shipment, the second size being the favorite for all but the earliest sprouts, which seem to sell a little better in the smallest package. The 60-quart package is a little too large for market requirements, moving a little slowly, and is now almost entirely abandoned for the 48-quart, on which the express charge is relatively less than on the 32-quart crate.

Sprouts are picked all winter, the very last of them going to market as late as April first; but nearly everything has commonly gone by March first. Mr. L. H. Hallock has tried freezing sprouts by embedding them in cracked ice, in order to hold them for the spring market, but found it impracticable to keep them frozen in an ordinary icehouse. With mechanical refrigeration the matter would be simpler, and doubtless will soon be employed. The frozen sprouts come out in excellent condition when thawed gradually.

YIELDS, PRICES AND PROFITS

Two thousand quarts per acre is considered a fair yield for late sprouts, used as a succession crop, but the best growers will not infrequently harvest as many as 2,500. In the case of early sprouts, when the land has been saved for them and part of the crop harvested in the field, 4,000 quarts can be picked, but this is more than ordinary. Even as high as 5,500 quarts have been raised on an acre.

The price per quart ranges from as low as four cents to as high as twenty-five. The prices previous to Thanksgiving are commonly low, but advance with the winter season till they reach their highest late in February or early in March. The average price is perhaps somewhere between ten and fourteen cents. One large grower found that an acre of early sprouts in 1908 brought a gross return of $400, the sprouts selling at fifteen to sixteen cents a quart. A return nearly as great is not uncommon with late sprouts.

The expense of producing an acre of sprouts is approximately as follows:

	Moderate.	Liberal.
Rent of land ($175 — $200 per acre)	$15 00	$15 00
Plowing and harrowing	2 00	3 00
Seed, 3 to 4 oz	1 80	2 40
Seed-bed (labor and fertilizer)	2 00	2 50
Marking field and applying fertilizer	2 00	2 50
Fertilizer (1,500–2,000 lbs.)	22 50	32 00
Setting out plants	2 50	3 50
Cultivation	4 00	5 00
Interest and depreciation on tools	2 00	4 00
Harvesting and stacking	8 00	12 00
Picking and packing	40 00	75 00
Crates and nails	20 00	30 00
Hauling to station	4 00	8 00
Total	$125 80	$194 90

The sprouts grown at Orient are all hauled to Greenport (four to five miles), and shipped to New York by express. The express charge on a 32-quart crate is 35 cents, and 45 cents on a 48-quart crate.

INSECTS AND DISEASES

These are the same as those which attack the cauliflower, and have already been dealt with in the preceding article.

SEED-GROWING

Selecting mother plants. Just before cutting the plants, or picking the bottom sprouts in case this is done before cutting, a

competent person should go through the field to select the seed plants. Two rows can be examined at a time, and the plants as selected can be pulled and thrown between the rows. Later the plants from four rows can be thrown into one, and left to lie until the crop is harvested or freezing is threatened. The person selecting the plants should have clearly in mind the ideal, and select only those which approach it much more closely than the average of the field. Among the most important characters to be sought are the following:

1. Hard, firm, medium-sized sprouts.

Close, compact arrangement around the stem, completely covering it from the ground well up to the head.

3. Medium height. Too tall a plant exposes the sprouts more to frost.

4. Small head or rosette at top.

5. Dark green color. Such plants are more resistant to frost.

Storing the plants. When the advance of winter makes it necessary to protect the mother plants, they are trimmed by removing the lower leaves (the upper ones must be left to insure good growth the following season) and are placed in a shed, cellar or trench. Most growers now prefer a shed or barn, as cellars generally prove too warm, and trenches do not admit of easy examination, or the removal of decaying plants. The storage building must be sufficiently tight to prevent the plants freezing, for though a slightly frozen plant may produce a good seed stalk so long as the head of the plant is not frozen, its vitality is likely to be weakened, and the danger to the head itself is too great. On the other hand, it is very important to keep the plants from heating, for yellowing of leaves and decay quickly follow a mild temperature. Neither must the plants be allowed to grow. Ventilation must be provided for, and the doors and windows opened whenever the outside temperature is above freezing.

The plants are best heeled-in in shallow trenches, setting a double row and leaving an interval of about ten inches between the double rows. This permits free circulation of air, and is much better than crowding all together in a compact mass, as when stacking to cover for the winter market. Occasionally a pail or two of water should be thrown over the plants to prevent too much drying of the soil. The plants should come out in the

spring as bright and green as when they went in, without any signs of yellowing.

Plants stored in cellars are troublesome to handle, because it is difficult to secure proper ventilation and control the temperature. The heat and moisture are likely to cause yellowing, if not downright decay. Such conditions also favor the white mold (*Alternaria brassiae* (Berk.) Sacc.) the most dreaded of all storage troubles. Once it has a foothold it destroys swiftly and surely. The sprouts near the base should be removed, for they usually rot if left, and sometimes cause the stump to rot.

Sheds with the floor about two feet below the surface of the ground are found to be desirable for storage. One grower has such a house 12 x 65 feet, the walls being insulated with a six-inch layer of seaweed. In setting the plants a path is left through the center. Since so many plants are handled, this grower does not take time to trim off any of the leaves, but finds it necessary to pick off the yellow leaves about the first of March, or earlier if the weather has been warm.

The plants can also be wintered in trenches. It is the practice to dig a trench a little wider than a spade, and deep enough so that the plants will come just flush with the ground when stood up in the trench. The plants are then packed in it in a double row, so that the trench is completely filled. No covering is put on at any time. One grower who recently stored about fifty plants this way brought only about half through to actual seed-bearing.

Cold frames are also successfully used for storing.

Setting out. As soon as the ground can be prepared in the spring (usually from the first to the tenth of April) the plants are set out in rows about three and one-half feet apart, and about two and one-half feet apart in the row. The sprouts soon expand, and a few of the large ones near the base will produce flowering shoots, but the chief growth is made from the terminal bud. A tall, branching flower stem is thrown up from this bud, and the first mature seed pods appear in the latter part of July. The ripening is uneven over the field, and even on the same plant, so that no method of gathering is feasible other than picking by hand. The seed-stalks are clipped with small shears and crowded into a barrel which the picker carries along. This receptacle is a little cumbersome, but effectually prevents any waste by the in-

evitable shelling out of the seed. The seed stalks are pressed and trod into the barrel until it can hold no more, and it may then be set aside until a convenient time for cleaning the seed, in case the stalks are very dry; but usually it is safer to remove the stalks from the barrel and dry them in the sun for a few days, spreading them on a blanket or canvas. The pods are then readily stripped from the stalks by drawing through the hand, and this same operation shells practically all the seed from the pods. The seed is readily shaken to the bottom on the blanket or in the barrel, and easily cleaned by pouring from a pail when a breeze is blowing. This seed is obtained a little too late for planting in the same season, and is used nearly a year later. Two-year-old seed is frequently used in event of the failure of the seed crop, for most growers retain enough annually to provide for such an emergency. The older seed germinates a little more slowly than the fresh, but is otherwise just as good, and the extra day or two is of no moment.

Under no circumstances would one of these growers resort to the ordinary stocks of seeds on the market, as these have been tried repeatedly in a small way, and always proved disappointing; the plants have usually been tall and vigorous, but with only a few soft, scattering sprouts, or none at all. The Long Island seed is immensely superior to the ordinary and undoubtedly the best in the country, if not in the world. It is apparently too high-priced for the dealer, bringing locally fifty to seventy-five cents an ounce, while the prevailing wholesale price elsewhere is about fifteen cents. It is scarcely necessary to add that the seed is easily worth the difference. It used to bring sixteen dollars a pound. One hundred plants will in good season produce ten to fifteen pounds of seed, or at the rate of 500 to 750 pounds per acre.

CELERY

Henry Greffrath, Lima, N. Y.

President, New York State Vegetable Growers' Association

The demand for celery in this country is constantly increasing; but the increased acreage planted each year and the quality and condition in which celery is marketed, with present methods of distribution, fully meet the demand at the present time. I do not make this statement hoping to discourage any one from entering into the growing of celery, but I do wish to impress upon everyone thinking of entering the business, and those already engaged in it, that the future prosperity of this industry depends on the quality of the celery grown and the condition of it when marketed, as well as on the method of distribution.

The climatic conditions of this vast country of ours are not the same in all localities; therefore, one set of rules for the growing of celery can not be applied to all sections.

The writer has been engaged in the growing and shipping of celery for the past thirty years in New York State, and will try to give the public what he had found to be the best methods for this part of the country.

SELF BLANCHING IN GREATEST DEMAND

The celery in greatest demand at the present time is a variety known as Self Blanching although in some cities the Green Golden Heart type is used to some extent. Self Blanching is the handsomest celery, when properly grown, of all known types, but it is also more subject to disease than any of the other types and demands great care from the time the seed bed is started until the crop is placed before the consumer.

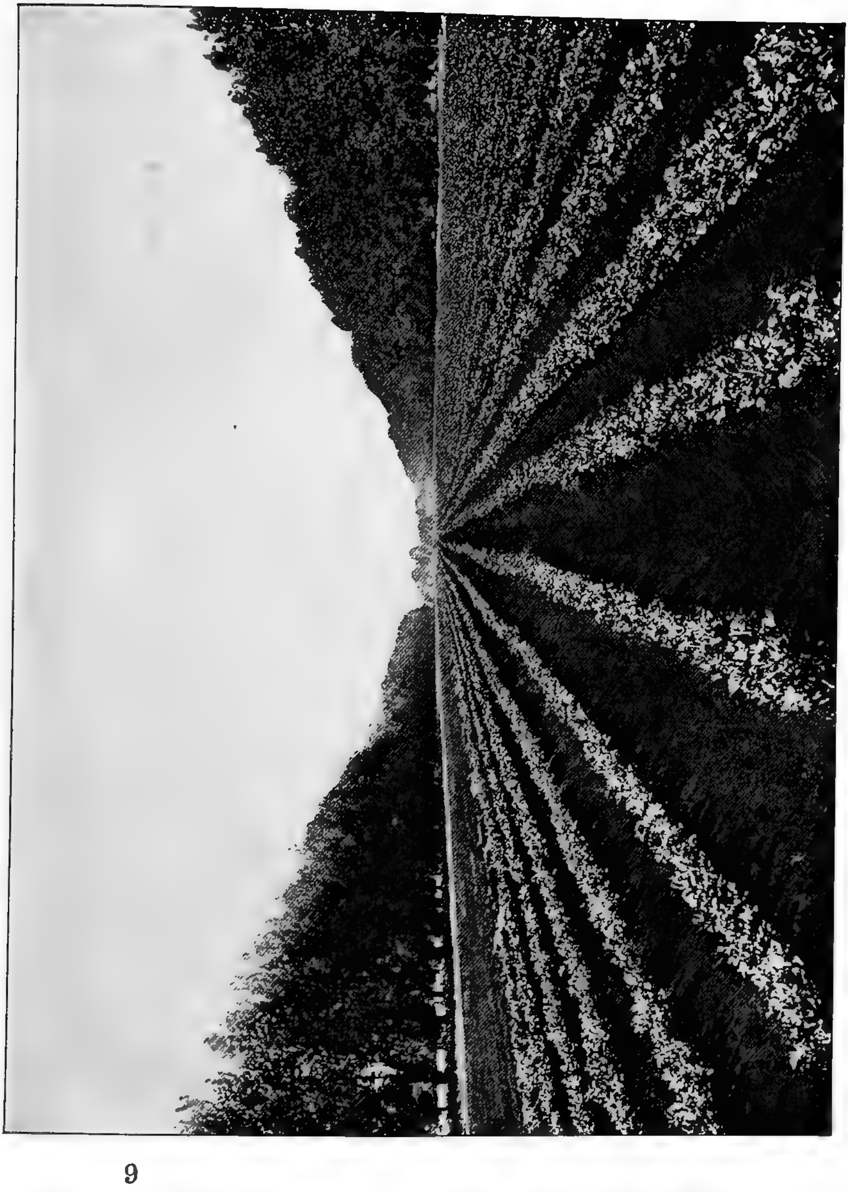

FIG. 446.—CELERY ON MUCK LAND. ALSO SHOWS WINDBREAK

GROWING EARLY CROPS

If one wishes to market his crop in the month of July, he must start the plants in a greenhouse, sowing the seeds March 1. I find that I can get stronger plants from beds in which the seed is sown broadcast than from sowing in rows. A grower should endeavor to sow the seed so that there will be from 200 to 250 plants to the square foot. If too thick, thin them out.

The seed bed should be made of the best soil available. I use muck only and have used the same muck in my greenhouse for the past fifteen years. Keep it free from all kinds of disease by sterilization and spraying. Never cover the seed with more than one-quarter of an inch of dirt and never let the seed bed become dry from the time seed is sown. Do not give too much water, for, if too wet, soil under glass will become sour and moss covered, and the plants will not do well.

FIG. 447.— BLANCHING THE EARLY CELERY CROP WITH BOARDS

Plant in the field just as soon as the season will permit. A light frost will do very little harm to celery if it is well planted and the land is wet, but will spoil celery plants if the ground is dry and they have not taken root.

Celery plants set May first should be ready to bleach by July first. I use lumber for bleaching and find that the celery is in a much better condition when bleached with boards than when paper is used.

Self-blanching celery seed has about 20,000 seeds to the ounce, but one can not count on more than 5,000 good plants to the ounce.

In growing early celery great care must be taken to keep the water level of the land down during the months of May and June so as not to force the roots of the celery to grow too near the top. On wet land the roots will be forced so near the surface that the fine rootlets will grow upward and out of the ground. It is impossible to keep a field of celery in good growing condition during the months of August and September, when the ground usually becomes hot and dry, if the water level was too high during May and June. Keep the land well drained and cultivate deep during wet weather, thereby forcing the celery roots deep down into the soil, and the crop will stand a long period of dry

FIG. 448.—LATE CELERY BANKED WITH EARTH FOR BLANCHING

weather. But if roots are near the top during dry weather the crop is sure to be checked badly and may be entirely spoiled by the heart turning black.

THE LATE CROPS

The plants for the fall or late crops should be planted in the fields from June second to July tenth. If the land is dry when planting, wet it well before and after the plants are set.

The late celery crop should be planted in rows three and one-half feet apart, plants five inches apart in rows.

FIG. 449.—GREENHOUSE FOR CELERY ON FARM OF HENRY GREFFRATH, SOUTH LIMA, N. Y.

There will be little trouble in keeping the roots of the late celery working downward as it is usually dry during July and August when the root growth of the late crop is being made, and nature causes them to go down for moisture. I have never seen much black heart in late celery, but if planted before July fifteenth it is apt to be so affected if the fall is dry.

The seed for a late crop should be sown in the open field from April tenth to May tenth. Protect the seed beds with wind breaks to keep the cold spring winds from sweeping over the beds, and keep them wet until the plants have four leaves. After that they will get along very well if the beds are not located on too dry a spot. I sow my outdoor seed beds broadcast making the beds five feet wide with a path of eighteen inches between. My early celery crop is planted in rows eighteen inches apart, plants set five inches apart in the row. One should not try to grow early celery unless he has good irrigation.

IRRIGATION AND DRAINAGE

I use the Skinner system of irrigation and would not be without it, but a grower should learn how to use it on a small scale before trying to grow a large acreage with it. A great many growers condemn the system because they do not know how to use it.

Celery requires a large amount of water during the growing season, and, unless one can give it the amount needed, he will not get the best grade of celery. The land must be drained perfectly. I use tile for drainage and have a six-inch tile ditch every seventy-five feet, placed thirty inches below the surface.

FERTILIZER

Two tons of high-grade fertilizer 4–7–10 and one-half ton of fish tankage per acre is to be recommended for early celery, sowing one ton per acre and working it into the land before the crop is planted. The remainder of the fertilizer and tankage is sown as a side dressing while the crop is growing, making about three applications — the last one about three weeks before the crop is to be harvested.

On my late crop I use about one ton of high-grade fertilizer 4–7–10, sowing one-half ton before planting, and working it well into the land; and sowing the other half ton as a side dressing in two applications on each side of the row, using care not to get any of the fertilizer on the plant. It will burn the foliage and if it gets down into the plant will spot and rot the stalks. Keep the cultivator in action from the time the celery is planted in the field.

Fig. 450.— Slate Ditch at South Lima, N. Y. Celery Land on Either Side

COST OF GROWING CROPS

It costs about $375 to grow, harvest and ship an acre of early celery. The sale per acre for early celery will run from about $700 to $1,200, according to market conditions when harvested. The cost of growing, harvesting and shipping an acre of late celery is about $150. The average yield per acre is about 200 crates. Prices paid for the fall crop in 1913 ran from $1.25 to $2.00 per crate, while prices paid in the fall of 1914 ran from .75 to $1.35 per crate. There is not much money in late celery for the grower when such prices as paid in 1914 have to be accepted for the crop.

CONTROLLING BLIGHT

By spraying, celery blight can be controlled under all weather conditions, but the spraying must be done in the most thorough way and started when plants are young in the seed beds. I have seen growers applying bordeaux with a sprinkling can. They were wasting time and money, and damaging the crop. When bordeaux is applied with a sprinkling can or any other kind of a machine that does not make a very fine spray under a high pressure, the mixture will form in large drops on the foliage of the plants and run down the stalks, lodging at the root of the plant, as a result of which the consumer will find a large amount of vitriol in the celery. There are cases pending in courts now in which the health department claims celery was offered for sale that was unfit for use—the result of careless spraying. Even if the growers escaped paying this fine they have not helped the consumption of celery through their careless acts. Celery can be sprayed every week through the entire season and yet when harvested not have a trace of bordeaux show between the stalks of the plant next to the roots. But the mixture must be applied in a fine mist and under a high pressure.

IMPORTANCE OF QUALITY

The future prosperity of the celery industry depends on the quality grown, conditions when shipped, and method of distribution. I have made this a study for some years and am sorry to say that a great number of New York State growers seem to care little about quality. They want something that will give them the largest number of crates per acre.

A few words on the condition of celery and the way it is being sent to the market. Every celery grower in the East and South can learn from the California grower how to put up celery so as to have it appear at its best. California celery appears better than any other when it arrives on the market. This is not due to the fact that the celery is better than that grown in other sections. There is no section in this country that can grow a better stalk of celery than can be grown in New York State.

If we stop to examine the California celery to learn why it shows up so well after being in transit five or six times as long as our shipments are, we will find that every defective leaf has been

taken off in the field; that the celery was carefully harvested and all the dirt removed from the roots — thereby keeping it clean — and that the crate was packed with uniform stalks on the outside and each one with the best face side of the stalk on the outside. We will also find that it is packed in a crate of good appearance.

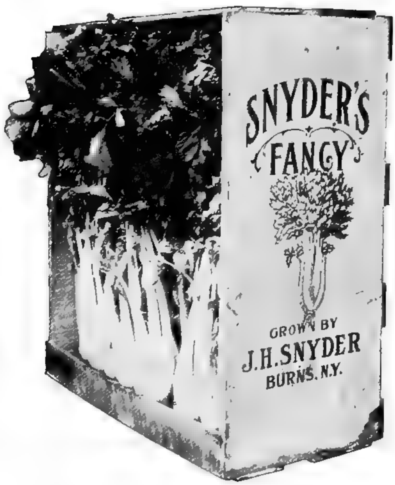

FIG. 451.—ATTRACTIVELY PACKED CELERY READY FOR MARKET

We can pack the same way and when we do we will be paid for it. I know of one instance where a dealer in one of our large markets paid a large sum each day for drawing away dirt and trimmings that should have been removed from the celery in the field before it was shipped. The grower must pay for this extra labor, and the sooner we come to understand this the better for us all.

SHIPPING AND MARKETING

We must also give more care to the loading of our celery when shipping by freight in refrigerator cars. Always use a crate that will load so that air spaces, each one three inches wide, will extend from one ice bunker to the other. Always slat the crate on the top so that the top crate will not drop into the lower one while in transit. Never let the celery become wilted before loading into cars, and start the car with temperature down. If it is warm in the car when loaded, cool by using salt on the ice in the bunker and when cool refill bunker with ice. Always mark the crates so that the trade can see who puts it up. A catchy name means nothing to the trade, but a good, honest package will bring the trade your way.

Now we come to the distribution. We send our celery to a few large markets and keep them glutted most of the time, while there are thousands of smaller towns that never receive a shipment from the grower. I am not in a position to state how to bring about better methods of distribution and hope that some one will soon find a way that will help us all along that line.

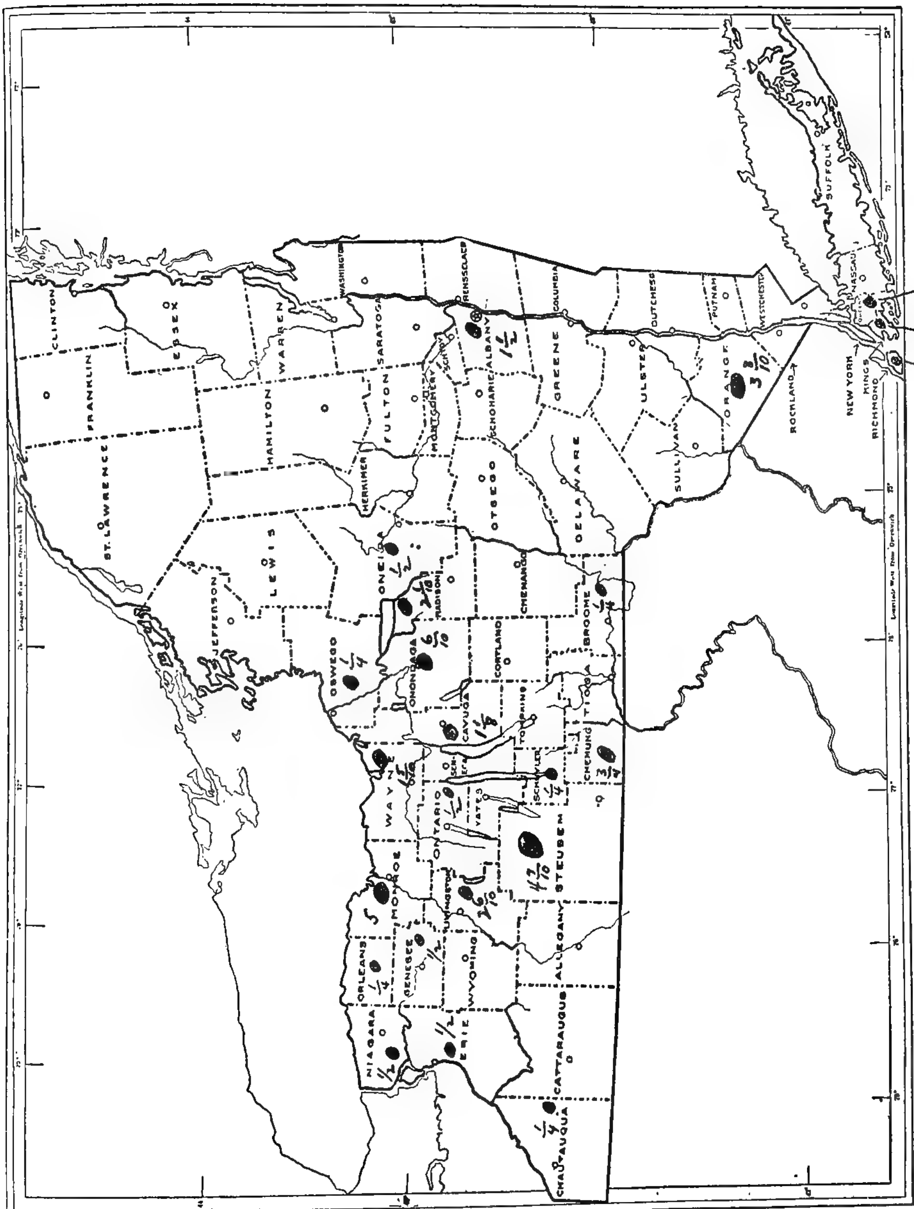

FIG. 452.—MAP SHOWING CELERY ACREAGE. FIGURES IN COUNTIES REPRESENT ACRES BY HUNDREDS

Acreage and Value of Celery Grown in New York State, by Counties

(Taken from U. S. Census, 1910)

County	*Acres*	*Value*	*County*	*Acres*	*Value*
Albany	150	$28,379	Oneida	35	$6,795
Allegany	2	24	Onondaga	56	11,962
Bronx	....	....	Ontario	49	13,486
Broome	20	5,111	Orange	329	290,342
Cattaraugus	4	500	Orleans	5	1,400
Cayuga	116	14,758	Oswego	1	800
Chautauqua	10	1,700	Otsego	4	1,680
Chemung	71	14,449	Putnam	....	....
Chenanga	....	....	Queens	159	32,263
Clinton	....	....	Rensselaer	3	400
Columbia	4	1,640	Richmond	47	17,306
Cortland	5	2,084	Rockland	....	....
Delaware	....	....	St. Lawrence	....	....
Dutchess	5	890	Saratoga	1	450
Erie	47	10,196	Schenectady	....	....
Essex	....	....	Schoharie	....	....
Franklin	....	....	Schuyler	....	....
Fulton	4	1,200	Seneca	16	5,015
Genesee	46	12,001	Steuben	468	145,638
Greene	2	893	Suffolk	1	248
Hamilton	....	....	Sullivan	....	....
Herkimer	1	300	Tioga	3	900
Jefferson	9	3,425	Tompkins	1	250
Kings	45	7,550	Ulster	7	1,115
Lewis	....	....	Warren	....	....
Livingston	259	77,656	Washington	1	300
Madison	211	34,215	Wayne	151	32,446
Monroe	498	145,047	Westchester	4	350
Montgomery	....	....	Wyoming	....	....
Nassau	16	5,750	Yates	2	50
New York	14	3,435			
Niagara	44	12,025	The State	2,926	$946,424

ASPARAGUS

C. C. Hulsart, Matawan, Monmouth County, N. J.

INTRODUCTION

The popularity which asparagus has achieved within the last two or three decades is marvelous. Thirty years ago or less, this vegetable was a luxury found on the tables of the rich; it is now found on the tables in almost every home, even those of small incomes. It is frequently recommended as an article of diet for the sick and convalescent.

The fact that asparagus appears in the market at a time of the year when few or no other fresh vegetables are available has had much to do with its increased consumption in our cities. It can also be preserved by canning, being in this form almost equal to the fresh article. This has increased its use, thus lengthening the season.

Within the last few years the cultivation of asparagus has been greatly extended, yet the demand is still greater than the supply except in and near large receiving centers, indicating there is room for more extended plantings remote from such centers. Every kitchen garden should have its bed, from which the table may be supplied, and many small farmers could supply themselves with much needed cash by growing this vegetable where their farms lie adjacent to a town or village.

HISTORY

The use of asparagus is almost as old as the hills and marshes on which the ancient writers say the two varieties of their day grew. First as a medicinal plant and then as a vegetable it was known to the Romans.

Writers of those days praise its virtues with enthusiasm and the epicure counted it one of the delights of his table. For want of a better way, the sprouts were preserved by drying. This is done yet by some.

So far had the gardeners of that day progressed in its im-

FIG. 453.—ASPARAGUS PLANTS 3 MONTHS OLD, 24 INCHES TALL. SWEET CORN IN DISTANCE

provement that Pliny was able to record spears of it weighing three to the pound.

Once made familiar with the use of the native article by the invading Roman soldiery, the Gauls, Germans and Britons appreciated its value, and it soon became one of their most prized vegetables. Early writers on horticultural subjects leave no room for doubt that as early as the first part of the sixteenth century — four hundred years ago — the use of asparagus was not only general in nearly every part of Europe, but that in some parts its development was such as to put the so-called "colossal" and "mammoth" of the present day upon their mettle, since spears weighing over one-half pound each were not of uncommon occurrence.

In France, Holland, Germany, Hungary and England, asparagus was both gathered by the peasantry in its wild state and carried to the towns for the tables of the prosperous burghers and grown in the landlord's gardens for his own table.

The early settlers of America, familiar with its use, brought the seed of the plant with them, and, though not native to this country, it found the climate congenial.

Although a "cosmopolitan" there are localities where its skilful culture has produced such results, both as to size of spears and average yield, that they are noted the world over as asparagus growing centers. Many of the states of the eastern coast from Charleston, S. C., to Boston, Mass., of the Mississippi Valley, and of the Pacific Slope, produce a great amount of asparagus, but it is on Long Island and New Jersey that much attention has been given to its cultivation, and there its culture has reached a high state of development.

BOTANY AND VARIETIES

The genus asparagus belongs to the Lily-of-the-Valley family. It includes about 100 species, all native of the Old World. A few species, including the familiar asparagus vine and the smilax of the florist, are in common cultivation for ornamental purposes, but most of them, having no recognized economic value, are known only to botanists.

All the various forms and varieties of the vegetable now in

common cultivation under the name of asparagus, and sold in the market as "grass," have been derived from one species, *Asparagus officinalis.*

Although but one species is to be found in cultivation there are many so-called varieties. Thus we have Colossal, Barr's Mammoth, Donald's Elmira, Palmetto, etc., in our own country, besides the numerous varieties cultivated in France, Germany, England, etc., when in reality there are but three or four of them, all of which deserve to have special names, being nearly all susceptible of classification under the general head of "Giant" or "Mammoth," indicative of the improved size produced by the superior conditions of manuring, soil, climate and cultivation, to which they have been subjected.

PRODUCTION OF PLANTS FROM SEED

For the asparagus grower there are two methods by which plants can be secured: first, by purchasing or saving the seed by which to raise them, and, second, by purchasing the plants from a seedsman or some grower. Taking the second method as the easiest and quickest way to start a bed it is suggested that the purchaser be very discriminating in what he accepts and who he accepts it from. He should know the variety he wants to plant, should allow no substitution, and accept good one-year-old roots only. Too many beds have been failures because of this oversight.

The first method is by far the surest where time can be allowed and care given to growing the young plants from seed. In using this method the first requisite is good seed. It is not sufficient to know that the seed will germinate and grow; it should have prepotency. In order to secure this kind of asparagus seed care must be exercised either by the seller or the grower himself. This is rarely ever done in the commercial trade, hence do not trust your plantings to commercial seeds. Go to the man who is producing the best "grass" and have him save seed for you from choice crowns — those not producing too many stalks, but large ones.

Reject all plants that produce an abundance of seed because such plants may transmit that characteristic to their progeny. It is a well known fact that those plants that are heavy seed producers

are equally light crop producers. Furthermore, not all the seed produced on a plant is equally good; that which is produced on the tips is usually small and of low vitality, and those that do grow produce weak plants.

All small and weak seeds should be rejected. This can be done by first floating off in water, at the time of saving the seeds, all that will float. The one who is saving the seeds must add water to separate the skins and pulp from the seeds after having crushed the berries. The berries should not be gathered until they have had some freezing; this softens them and makes the work much easier. Several washings will be needed to clean them perfectly. Let all seeds that do not sink readily run off with the water. When washed clean, spread out thinly to dry. When quite dry run through a windmill in which is placed the lower screen, with mesh just large enough to screen out all small seeds and allow the balance to pass over and out in the usual way. By turning the crank on the windmill at just the right speed any light seeds that escaped elimination by the water test can be blown out with the mild current. We then have the very best seed that can be procured without special breeding.

GROWING THE YOUNG PLANTS

The seed of the asparagus is very hard as well as very hardy. It requires a long time to germinate, hence should be planted as early as the soil can be worked and gotten into good condition. The plants can be grown on almost any kind of soil, but preferably not too heavy. Select a site near the buildings where poultry can run through it; they will keep the young plants free from the beetles.

After deciding where the seed bed is to be made the next requisite to success is the preparation, fertilization, and care of the young seedling plants. Remember first, that the asparagus plant is a very heavy feeder; second, that we are to grow a strong, vigorous root, as large as is commonly sold commercially at two years' of age, and do it in one season. In order to do that *feed* and *care* must not be neglected, therefore liberally apply yard or stable manure broadcast over the entire area where seeds are to be sown, before plowing. Plow and prepare as for other crops; mark off

rows about 2 feet, 9 inches distant, opening each furrow with a plow; scatter in each row fertilizer analyzing about 4-8-10, at the rate of 800 pounds per acre. Mix this well with the loose soil and cover by throwing a furrow on it from each side, making a low ridge, and rake off flat. Sow seeds with a drill set to sow about three seeds to the inch, and also set to sow at a depth of one inch or a little more. If the soil is light one and one-half inches will be better.

The plants will be from three to four weeks coming through, according to the temperature and the time planted. From now on the main attention is cultivation, hoeing and additional fertilization. The young plants must be kept scrupulously clean and the soil around and about them mellow by frequent hand hoeings and horse cultivations.

Early in July an application at the rate of 200 pounds of nitrate of soda applied alongside the row and worked in, will be found valuable. This will stimulate the vegetable growth of the young plant but will be effective only about a month, so another application in August is desirable. The latter will last through the season. The object is to get as much growth as possible in one short growing season. If this work is carefully done and instructions carefully carried out, a better plant will be had at one year of age than is commonly grown in two years, and far better than any two-year-old plant.

PREPARATION OF THE PERMANENT BED

Since much depends on the appearance as well as size of the shoots much thought should be given to the soil where the bed is to be established. The soil should be more or less of a sandy nature, free from stones, fairly level, sloping toward the sun rather than from it, and the more depth of soil the better. On a soil that is thin and that is situated above a compact subsoil this crop will not do its best. The subsoil should be quite open — one easily penetrated by the roots.

The preparation of a plot or field for asparagus should begin the season before the plants are to be set. This can be done by growing thereon some hoed crop that requires liberal manuring and clean cultivation, allowing no weeds to go to seed. As soon

as the crop is gathered, sow the land to some cover crop — crimson clover, if it will grow. If in a locality where none of the legumes can be grown, sow to oats or barley, but not rye, as the latter makes too much trouble in fitting the soil the following spring.

Sometime during the winter, prior to setting the plants, broadcast the area with yard or stable manure, using twelve to fifteen tons per acre. As early as possible plow as deep as soil will permit, turning everything under, harrow and mark off in rows five and one-half feet apart using a good two-horse turning plow, and then go each way in the same furrow making it as deep as the soil will permit, but do not go more than one inch into the subsoil. In the bottom of the furrow set the plants.

SETTING THE YOUNG BED

The young crowns should first be sorted and all small and weak speciments thrown out. Second, a sharp lookout should be kept for any individuals that have numerous eyes or bud fully developed, and they also should be cast out. A plant with that characteristic will always do the same, that is, produce numerous but small shoots.

Have a good lively boy to drop the plants and have him drop them on the inside edge of the plow furrow. Then let the setter grasp the plant by about one-half of the roots and place his thumb on the buds; straighten out the other half of the roots; place the plant on the solid bottom of the trench and cover with about two inches of soil; step forward with one foot on either side of the plant just set, which firms the soil. Place the next plant twenty inches distant and continue. Some growers plant as close in the row as fifteen or sixteen inches, while others claim two feet the proper distance. It resolves itself down to this: the narrow distance gives a crop earlier in the life of the bed but makes it shorter lived. The farther apart the plants are set the longer the life of the bed — all other things being equal. Some early hoed crop like peas, beans, carrots, etc., may be grown between the rows of asparagus the first season but not after. No manure should be used under the young plants because they live and start better on a solid bottom, and because it induces mice to harbor under it and destroy numerous plants.

CULTIVATION AND FERTILIZATION

About the time growth begins give a dressing of fertilizer down the trench over the young plants — any good potato formula will do. Use about the same per given length of row as for potatoes.

Cultivation must begin early, a small-toothed implement being used to fine the soil. Some soil should be allowed to run down beside the young plants, but not too much. The grower should be all season filling the trench.

Frequent cultivations and numerous hand hoeings will be required to keep the soil mellow and the weeds down, and this must be done or the whole thing spells failure. The future productiveness of any asparagus bed is largely governed by the way the young plants are grown and the way the permanent bed is cared for the first two years of its existence. If neglected, either in cultivation, hoeing, fertilization, or controlling of the insects, that neglect must be paid for in low yield and poor quality. A midsummer application of nitrate of soda of about 150 pounds per acre, applied beside the row and worked in, will be found beneficial.

During the fall of the first year apply a good dressing of animal manure. The best way to do this is to plow a furrow away from the plants on each side and put the manure therein and cover it by plowing back over it. This induces the root system to form down below and out of reach of the implements of cultivation.

All later manurings should be in an open furrow midway between each row and it covered. Once in two years will do for animal manurings where the soil is fairly productive, but an annual application of fertilizer applied at the first working of the land in the spring is essential. Be sure to apply this broadcast; not over the row as is sometimes done. By broadcasting it is better and more evenly distributed, hence where the plants can use it more readily.

At the close of the cutting season, when the bed is being leveled off, apply a dressing of nitrate of soda broadcast at the rate of 225 pounds per acre. This in my judgment is quite important. It is at this time that the plants need stimulating and the nitrate supplies it. I believe, too, it wards off the rust. Beds so treated are later in showing that disease.

Cultivation should be kept up sufficient to destroy all weeds and keep soil mellow.

FIG. 455.— MAP SHOWING ASPARAGUS ACREAGE. FIGURES IN COUNTIES REPRESENT ACRES BY HUNDREDS

INSECTS

Nothing that I know of can be done for the beetle during the cutting season. All that can be done is to destroy the breeding stock the season before. This can be accomplished by spraying the foliage with arsenate of lead paste, 6 pounds to 50 gallons of water, with a heavy pressure. This may seem strong but less will not kill all old bugs. It is very important that the beetle and larvae be kept from young planted fields; they will soon damage it beyond recovery if left unmolested.

HARVESTING AND MARKETING

In this section white and half "green grass" is produced. The difference between the two is that one is cut as soon as it appears above ground, while the other is allowed to grow to five or six inches in height before cutting.

It will be readily seen that if white "grass" is to be cut there must be sufficient soil over the crowns to permit the knife to be thrust down deep enough to cut the shoot at marketable length, which is about nine inches. Hence we ridge, using an implement made for the purpose that piles the soil on top of the row and smoothes it off. For all green grass this need not be done.

Cutting is done every other morning until the weather becomes warm, when it may have to be cut daily. The "grass" as cut is taken to the packing shed and washed, when it is ready for the girls or women to bunch it. We make only two grades, primes and culls. The cut of the day is shipped in the late afternoon to the city, arriving there about midnight. Growers ship to New York City, Brooklyn and Newark depending on the market in each place. The "grass" is sold by commission men the following morning, the price ranging from $1.00 to $4.00 per dozen bunches according to supply and demand.

We read of wonderful yields so far as bunches are concerned, but 2,000 bunches of 3 pounds each or more is the exception not the rule. The yield is more frequently 1,500 bunches. The season of 1913 was very good, while that of 1914 was very poor, prices were low and the supply was greater than the demand. Thus it changes. While there is no bonanza in asparagus culture yet it pays those who know how to grow it.

ACREAGE AND VALUE OF ASPARAGUS GROWN IN NEW YORK STATE, BY COUNTIES

(Taken from U. S. Census, 1910)

County	*Acres*	*Value*	*County*	*Acres*	*Value*
Albany	147	$18,114	Oneida	11	$2,823
Allegany	3	175	Onondaga	58	8,357
Bronx	....	....	Ontario	26	4,561
Broome	6	2,032	Orange	21	4,155
Cattaraugus	....	....	Orleans	2	166
Cayuga	7	1,300	Oswego	....	....
Chautauqua	5	570	Otsego	1	100
Chemung	8	1,396	Putnam	....	....
Chenango	....	....	Queens	6	1,250
Clinton	....	....	Rensselaer	5	590
Columbia	12	1,390	Richmond	3	125
Cortland	1	98	Rockland	1	210
Delaware	....	....	St. Lawrence	....	....
Dutchess	20	2,858	Saratoga	5	1,400
Erie	30	5,928	Schenectady	14	2,736
Essex	....	....	Schoharie	....	....
Franklin	....	....	Schuyler	21	1,080
Fulton	2	175	Seneca	24	3,709
Genesee	1	100	Steuben	....	....
Greene	2	40	Suffolk	358	33,784
Hamilton	....	....	Sullivan	....	....
Herkimer	3	515	Tioga	....	....
Jefferson	5	505	Tompkins	5	1,420
Kings	....	....	Ulster	14	1,622
Lewis	....	....	Warren	....	....
Livingston	13	1,312	Washington	1	56
Madison	38	3,335	Wayne	10	1,397
Monroe	47	8,468	Westchester	8	1,220
Montgomery	2	240	Wyoming	1	90
Nassau	47	6,358	Yates	4	520
New York	2	40			
Niagara	3	1,050	The State	1,003	$127,370

MELONS

Chas. D. Barton, Marlton, Burlington County, N. J.

LOCATION

In the production of melons we are dealing with a group of plants that are almost semi-tropical in their natural habits, and in our temperate climates they thrive best in warmest weather. They will flourish in moderate droughts, but an excess of moisture retards growth, and cool nights are frequently a cause of failure. A full appreciation of these facts is the foundation on which a successful melon grower must depend for the solution of the problems that may confront him.

Earliness is an important factor, both from the standpoint of the financial return and the greater ease with which the fungous diseases can be controlled. Advantage should be taken of any aid which tends to advance the time of ripening.

The selection of the ground is of prime importance to this end. It must have good drainage, so that the excess moisture of a heavy rain can run off quickly. For the canteloupe a sandy loam gives best results, while the watermelon does best in the very sandy soils. A location sloping slightly to the south, or protected from cold north winds, has an additional value.

VARIETIES

The selection of varieties must be determined by the demands of the market to be supplied. In a general way markets are now demanding a medium-sized canteloupe, and the elongated shape, or Rocky Ford type, is the most popular. Some trade demands the pink, while others still prefer the green-fleshed varieties. The Sugar Sweet has with us proved a profitable green-fleshed variety, combining quality and earliness with good cropping; and in our experience is more blight-resistant than any pink-fleshed variety.

The Tom Watson watermelon has become very popular in the

last few years. The quality is very good and it stands shipping well, but the vines seem rather weak and sometimes fail to mature the later settings of fruit. This fact may force us to return to the Dixie, although a little coarser in flesh and less regular in shape. Care in the selection of seed is of more importance than variety.

Seed selected from the best specimens of the home patch is superior to that secured by cutting the entire crop as the commercial seedsman must do.

PREPARATION OF SOIL

The preparation of the soil should be thorough, and an abundance of humus and plant food are essentials. Stable manure, broadcasted and plowed in, is valuable when available, but in our own practice we depend upon green manure for the humus, and chemicals for the additional plant food. The ground should be plowed early so that the vegetable matter is somewhat decomposed and thoroughly mixed with the soil. If sod land, fall plowing and early working in the spring will give a looser soil for planting. The better the preparation, the better and more easily will the cultivation of the small plants be accomplished.

Before the expected time of planting, 150 pounds of muriate of potash and 450 pounds of acid phosphate per acre are broadcasted and harrowed in. Two hundred and fifty pounds of tankage or other fertilizer containing 20 pounds of organic nitrogen in good form, is placed in drills running east and west across the field. Good ridges are thrown up and cross marked — four feet for canteloupes and ten feet for watermelons.

When the first runners are about twelve inches long, 100 pounds of nitrate of soda and 100 pounds of tankage are applied and worked in. The material must not be allowed to come in contact with the vines. This application furnishes an abundance of plant food at the time the fruit is making its most rapid growth, and adds to the quality of the product.

PLANTING

Melons may be started in plant boxes in cold frames and transplanted to the open ground when four or five rough leaves have been made.

The plants, however, are difficult to manage under glass and, for commercial purposes, the time gained in ripening does not warrant the expense of the operation. By the following method of planting we have succeeded in picking ripe fruit from seed planted in the open field almost as soon as from the transplanted plants, and at so much less expense that we have entirely abandoned the use of the cold frames.

Upon the approach of the first spell of warm weather after the tenth of April, we place half of the seed in a pan and cover it with water for twelve hours at a temperature of 90 degrees. The water is then drained off, the pan covered with a cloth and kept at the same temperature for another twelve hours. During this twenty-four hours we have furnished ideal conditions for the germination of the melon seed, and germination has advanced more than it would in a week in the ground at that time of year. We next mix the dry half of the seed with the soaked seed, and are ready to plant. With a cup of the mixed seed in one hand, and facing the south side of the row, we make a level opening with the toe of the shoe as far into the side of the row as we can without breaking the crest of the ridge; with the other hand, we drop from eight to twelve seeds in a line at right angles to the ridge. We then elevate the toe and cover, leaving the soil over the seed in about the same position as we found it. The following advantages have been gained by this method of planting, namely:

1. By sprouting the seed we secure an earlier stand than could be done by planting seed direct from the bag.

2. By mixing sprouted and dry seed we make two plantings at one operation. We have plants coming through at different times in case a late frost should injure the first ones, and the work of replanting is saved.

3. By covering with the elevated toe we produce a sloping surface over the seed which will not hold water. In case of heavy rains this protects against an excess of water over the seed, and prevents the formation of a hard crust for the delicate plants to break through.

4. By making the opening with the toe held level, and covering with the sloping surface, we have the seed at different depths. If

dry weather follows planting, the seed nearest the top will probably dry out and fail to come up. If heavy rains follow planting, the deep ones, near the center of the ridge, will probably never be able to push through the amount of soil over them. Between these extremes, there must be some seeds which are suited to the conditions of moisture which they encounter.

5. The sloping surface is in the position to absorb the greatest amount of heat possible from the slanting rays of the sun.

6. By planting on the south side of the ridge, the young plants are protected from cold winds by the crest of the ridge above them.

CULTIVATION

Cultivation is a great aid in maintaining the loose, porous soil conditions in which the melons thrives, and should be commenced as soon as the plants are well established.

If there is no inter-crop, the horse cultivator may be used in both directions, but hand hoeing must be depended upon near the small plants, and loose soil thoroughly worked up to them. The sooner the plants are thinned down to one in a hill, the easier the hoeing will be and the more evenly balanced plant we will have. Experience has taught us that we get more and better fruit from one plant in a hill than from any other number.

Cultivation should be continued frequently until the vines reach across the rows, being careful to select times when the soil is not very wet.

Care is necessary in handling the vines in the later cultivations. Twisting them is liable to break off the small roots, and it is difficult to return them to their original position. The vine that is turned squarely over falls back in position naturally and will seldom break if the dew is off before commencing work. Vines should be returned to natural positions as quickly as possible, and should never be left wrong side up over noontime or at night.

INSECTS

Cut worms, striped squash bugs and melon aphis are serious enemies. The regular cut worm mixture of paris green and bran, distributed over the ground before the plants appear, will prevent loss from cut worms. Offensive odors disturb the squash

bug and any ill-smelling substance will rout him. Land plaster scented with kerosene is frequently used. Fish scrap or tankage, if prepared without the use of acid, are effective. Frequent hoeing and early thinning rob him of protection during the cool night. The melon aphis is only an occasional pest. When once established, its position on the under side of the vine and the consequent downward folding of the leaf, make it very difficult to fight. When the infestation becomes general throughout the field the task is hopeless. If, however, a few affected leaves showing in June can be washed with a contact insecticide, such as whale-oil soap, the infestation may be held in check until the multiplication of the lady bugs comes to our assistance. Cantaloupes are more frequently injured than watermelons.

FUNGOUS TROUBLES

The most serious problems of the melon grower in cool climates, particularly in the cantaloupe patch, are the leaf blight and anthacnose. Spots appear on the top of the leaves causing them to curl upward and die very quickly. Greatest damage is caused during cool nights followed by heavy fogs and sunny days. The very early plantings mature most of the crop before injury occurs. Many growers depend on early planting with good fertilization and cultivation to produce a good crop before the injury becomes severe. Others have found that a thorough coating of the leaves with bordeaux mixture at frequent intervals from the time of the appearance of the first rough leaves until maturity, has been effective. With the vines over the ground, however, this is a difficult and unsatisfactory operation, and the business of growing late plantings has been entirely destroyed in most sections on account of these diseases.

MARKETING

The cantaloupe is at its highest state of perfection when allowed to remain on the vine until the fruit freely parts from the stem and is then eaten within a few hours. Herein lies the problem of successful marketing. With a nearby market, the operation is simple. Careful picking every morning and prompt delivery gives the consumer the fruit in best condition. When,

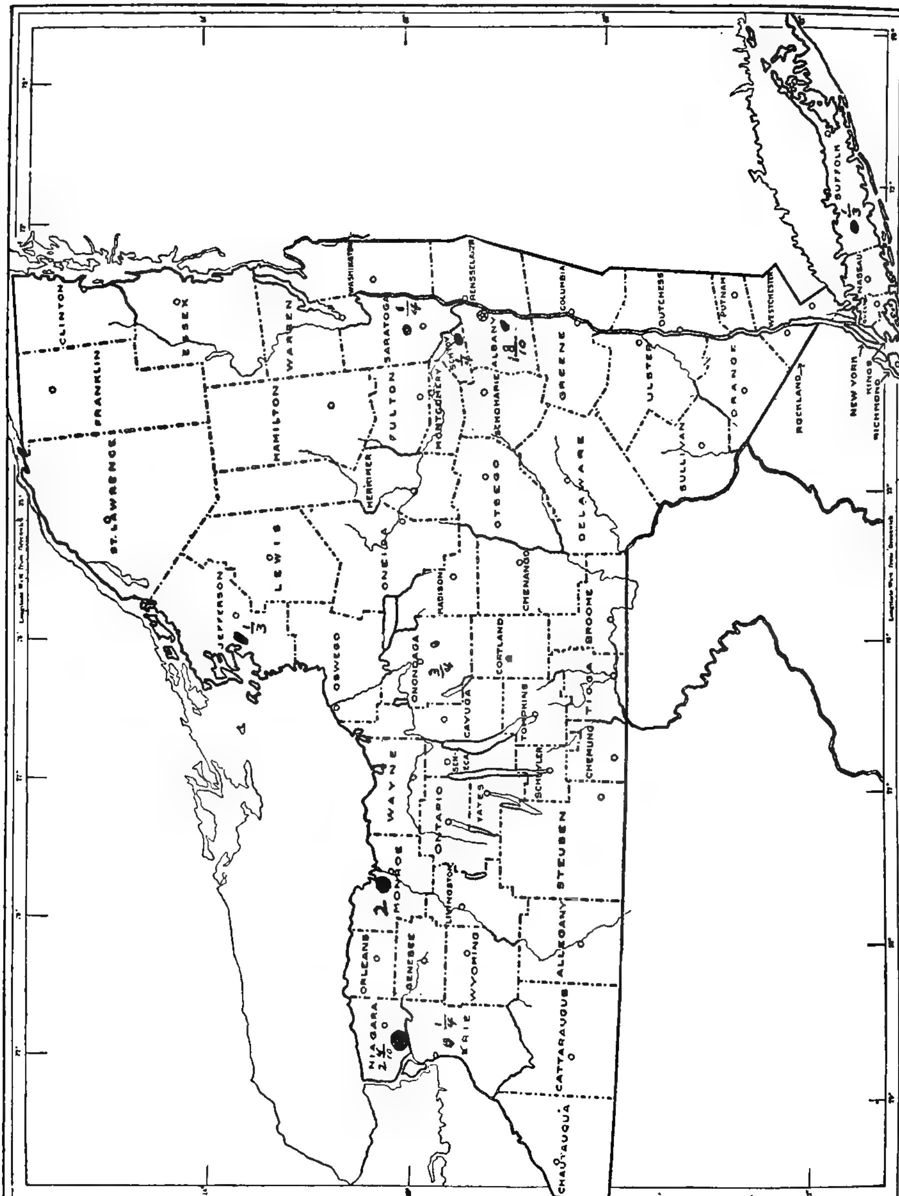

FIG. 456.—MAP SHOWING MELON ACREAGE. FIGURES IN COUNTIES REPRESENT ACRES BY HUNDREDS

however, forty-eight hours or more must elapse before the fruit reaches the consumer, it takes careful picking and a trained eye to anticipate the ripening of the fruit, so as to get it to the consumer before deterioration has commenced on account of over ripeness, unless refrigeration is available. In picking for any market the cantaloupe which is overlooked and allowed to remain in the field one day too long is lost, or worse than lost if then put in the package. Disappointment in prices of sales is more often caused by including too ripe fruit than from any other one cause. One the other hand, the watermelon can be kept from a week to ten days after picking without undergoing deterioration, and so can be shipped long distances without refrigeration.

PROFITS

The melons are crops that are best suited to farms where extensive gardening operations are desired, rather than to those of small acreage where very intensive methods are practiced and large money returns are expected from each acre.

One thousand watermelons from an acre is a very good crop, and ten to twenty dollars per hundred is a good range of prices.

Cantaloupes seldom give more than five hundred five-eights-bushel baskets to the acre, and prices are liable to vary from thirty cents to one dollar per basket. These returns per acre would not be attractive to some market gardeners, but when we consider that fifty to seventy-five dollars per acre will cover the cost of producing and marketing these crops, the margin of profit is fair. Besides, other crops may be produced from the same ground at very little expense. Market peas planted early between the rows, grow well on the fertilizer applied for the melons, furnish a windbreak for the small melon plants, and the vines add humus and nitrogen to the soil at the time the melons most need it. A tomato plant placed between each hill ten days before the last cultivation has often materially increased the money return for us.

One strong point is the fact that crimson clover and hairy vetch sowed at the last cultivation always makes a good growth, and a melon crop in the rotation improves the fertility and humus content of the soil.

ACREAGE AND VALUE OF MELONS IN NEW YORK STATE, BY COUNTIES

(Taken from U. S. Census 1910)

County	*Acres*	*Value*	*County*	*Acres*	*Value*
Albany	179	$27,610	Oneida	2	$800
Allegany	....	....	Onondaga	76	9,078
Bronx	....	....	Ontario	8	950
Broome	9	400	Orange	10	1,603
Cattaraugus	2	250	Orleans	13	1,967
Cayuga	14	1,769	Oswego	5	825
Cattaraugus	2	350	Otsego	....	....
Chemung	1	300	Putnam	....	....
Chenango	....	....	Queens	....	....
Clinton	....	....	Rensselaer	13	1,363
Columbia	2	150	Richmond	....	....
Cortland	....	....	Rockland	2	40
Delaware	1	25	St. Lawrence	....	....
Dutchess	4	340	Saratoga	27	1,888
Erie	28	3,185	Schenectady	21	2,890
Essex	1	150	Schoharie	....	....
Franklin	2	300	Schuyler	....	....
Fulton	....	....	Seneca	7	1,000
Genesee	1	148	Steuben	....	....
Greene	5	850	Suffolk	31	3,299
Hamilton	....	....	Sullivan	....	....
Herkimer	....	....	Tioga	....	....
Jefferson	37	5,050	Tompkins	3	100
Kings	....	....	Ulster	9	425
Lewis	....	....	Warren	2	100
Livingston	12	1,557	Washington	....	....
Madison	....	....	Wayne	2	150
Monroe	196	24,890	Westchester	2	100
Montgomery	3	700	Wyoming	....	....
Nassau	....	....	Yates	5	300
New York	....	....			
Niagara	239	24,638	The State	978	$119,650

SQUASHES AND PUMPKINS*

SQUASHES

Types. There are two distinct types of squashes, summer and winter. The summer squashes are used in an immature stage, before the shell or seeds harden. In some varieties the flesh becomes coarse and bitter at maturity. The winter squashes are allowed to reach full maturity unless overtaken by frost, and under proper storage conditions may be kept until late in the winter. The summer varieties commonly grown are of bush form, while the winter varieties make long trailing vines. The summer varieties are less exacting as to soil and climate than the winter sorts and are the more reliable crop producers under unfavorable conditions. They will make a crop in the shade of a corn field and will also endure the intense heat of southern summers. Winter varieties, on the other hand, do not thrive in competition against corn, and suffer severely from extreme heat or drought. The summer varieties have hard, dense stems and vines, while those of the typical winter varieties are more fleshy and succulent. The summer varieties are small fruited and the winter varieties large fruited.

In addition to the two common types already mentioned, there are also two others that are grown to some extent. One is a small-fruited type resembling the summer varieties in size of fruit, texture of stem, and ability to withstand heat and drought. They are, for the most part, running rather than bush varieties. The fruit may be used at an immature stage, like summer squash, and they are also of good quality when mature. They may be kept for winter use the same as the large winter varieties. A typical representative of this class of squash is the Perfect Gem. Another type of squash grown to a limited extent in this country is the winter Crookneck or Cushaw. It forms long, often curved, fruits of large size, in which the seed cavity is confined to one end,

*From J. W. Lloyd's *Productive Vegetable Growing;* J. B. Lippincott Co., Phila. Pa., publishers.

while the rest of the squash is a neck, three to five inches in diameter, which consists of solid flesh.

In England the vegetable marrow is used the same as summer squash is in America. It forms a running vine, and is handled the same as other squashes. It is grown to a very limited extent in this country.

Squashes in general are grown much less in America than their importance as a food would seem to warrant. Markets that handle hundreds of carloads of watermelons during a season are easily overstocked with a few carloads of winter squashes.

Culture. Squashes thrive best in soil containing considerable humus. Manure applied broadcast and also in the hill contributes greatly to the production of a good crop. The method of preparing a field for planting is much the same as for other vine crops. The entire area should be plowed and pulverized before the hills are made. For bush varieties the hills may be four by four feet; for running sorts they should be from eight by eight to ten by twelve, depending upon the vigor of the particular variety and the type of soil. Usually the seed is planted in the open ground, but occasionally the summer varieties are started in hotbeds and transplanted to secure an early crop. The same precautions must be taken as in transplanting muskmelons and cucumbers. Two or three plants should be allowed in each hill. The tillage and general care of the crop are the same as for the other vine crops. The running varieties make a rampant growth and no amount of training will keep them within prescribed limits. For this reason they should never be planted close to small vegetables that occupy the land late in the season.

PUMPKINS

Pumpkins are of three principal types: "mammoth," grown mainly for exhibition purposes; "field," grown especially for stock feeding; and "pie," produced principally for the making of pumpkin pies. Almost any variety of pumpkin may be used for making pies, but some sorts are especially adapted to this purpose. They are finer grained and sweeter than the other sorts. They may be stored for the winter supply of pies or the flesh may be canned for the making of pies at any time of the year.

Field pumpkins are often grown as an incidental crop in corn fields. They are like the summer squash in being able to endure the shade and also the competition against the corn. However, pumpkins are much more likely to produce large crops if they are relieved of such competition and given a piece of land to themselves. In this case they are planted and cared for much the same as winter squashes. However, on rich land it is not necessary to apply manure in the hills unless extra large specimens are desired.

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PEAS

A. E. Wilkinson

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Peas have been known for centuries, being common among the early Greeks and Romans. At the present time they are widely distributed, being found as a native in Europe and probably in all parts of the United States. The crop is particularly popular in the northern sections of the United States, where it

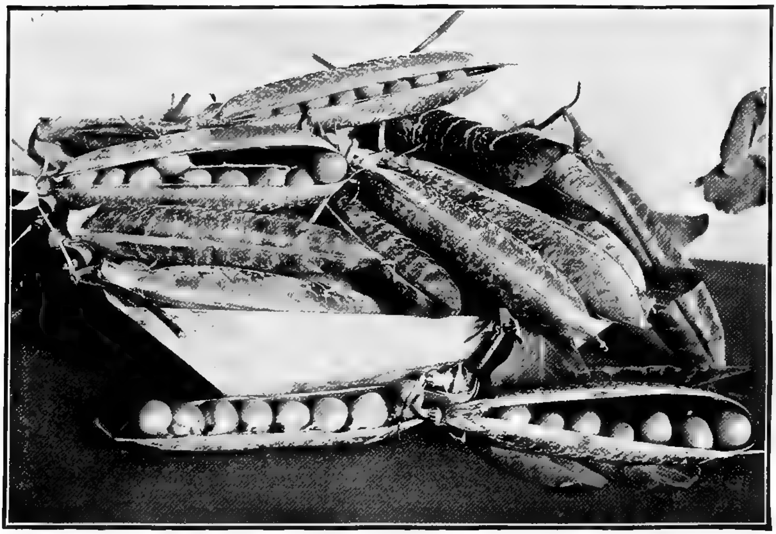

Fig. 457.—The Gradus or Prosperity Pea. One of the Earliest Large-Growing Wrinkled Varieties. Pods Are Very Abundant and Well-Filled

grows at its best. The requirements of this crop are, a cool temperature and abundant moisture. This undoubtedly accounts for its fine growth in the northern sections of the United States.

SOILS

Regarding the different soils for this crop, a non-acid clay soil or a silty loam seems to be best for the late varieties, whereas a sandy loam is seemingly best for all early varieties. On muck

soils the pea crop may not be desirable, owing to the fact that it produces a rank vine growth and a limited pod formation. Contrasted with this are the light sandy soils which do not produce enough vine but do produce small pods in large quantities. A good example of adaptability of varieties may be shown by citing an instance. In southwestern New York State the cannery demands a late type of peas. Men growing peas on the hillsides on slit and clay loams were making from twenty to forty dollars per acre, whereas men growing the same variety of peas on river-washed gravel were actually losing ten dollars per acre. The latter soil was unfit for late pea production but would produce good crops of extra early peas.

ROTATION

As a rule, peas should be rotated each year. Where they are raised for canning, the peas should follow sweet corn or potatoes, or some other cultivated crop, because there will be a tendency toward a smaller production of weeds. It has always been noticed where wheat follows peas that the wheat crop is increased. In the garden, peas could be rotated with root crops or with other crops of a different nature. Combinations for rotation will easily suggest themselves to any thinking person.

FERTILIZERS

With peas, nitrogen and humus may be oversupplied, and it is necessary to be careful not to use large quantities of stable manure with this crop. Potash and phosphoric acid are never oversupplied. It has been found that wood ashes and well composted hen manure will give very good results. It is advisable not to mix these substances any length of time before applying. Better apply each separately. A good fertilizer for this crop is 350 to 500 pounds per acre of a fertilizer containing one per cent. nitrogen, six to eight per cent. phosphoric acid, and five to seven per cent. of potash. In some cases, 400 to 500 pounds of a mixture of potash and phosphoric acid, of which the percentages of the potash and phosphoric acid are equal, has given good results.

INOCULATION

Some attention is being given at present to the inoculation of peas. With intensive vegetable culture, inoculation may be of value. In certain locations where peas are not doing well it would be advisable to try inoculation on a limited area. It has been determined that inoculated seed is better than inoculated soil. The method of inoculating is the same as for clover, alfalfa and other legumes.

PLOWING AND FITTING

Where heavy lands are concerned, plowing in the fall seems to give the best results. With lighter soils, such as sandy and gravelly loam, spring plowing is undoubtedly preferable. In the spring of the year thorough harrowing, discing, and smoothing should be given. The preparation of the seed bed is very important and should receive the closest attention.

SEED

It is important that good seed should be obtained. Good seed can be produced in New York State. A person starting with certain varieties and practicing the method of selection could soon obtain a seed which is far superior to any that he could purchase. A test carried on by one experiment station is of interest. Where large seed was selected and planted, a yield of thirty bushels of grain and a ton and a half of straw was obtained. Small seed gave a yield of twenty-four bushels of grain and a ton and a tenth of straw. Split peas and others as they came from the thresher gave a yield of ten bushels to the acre. Weevil infested peas gave only thirty per cent. germination. In other words, of the three bushels of peas planted to the acre, practically only one bushel germinated, greatly reducing the yield. As a rule, seed produced in the northern sections of the United States and Canada is to be preferred to seed produced in the southern part of the country. Seed from certain reliable seed houses, where these firms have made a specialty of certain varieties, is to be preferred to the ordinary run.

PLANTING

The time to plant will vary somewhat according to the locality. One of the best rules to follow is, plant when the land is ready in

the spring, which means generally April 20 to May 16. In the home garden and with many market gardeners, the planting should be arranged so there would be a succession.

AMOUNT OF SEED

The amount of seed to use varies with the soil, the variety, and the purpose in growing, the amount being from two to six bushels. For peas grown for the cannery, three bushels per acre seems to be a good average. In the home garden, where the rows are planted very close together, as high as six bushels would be used at certain times. The same may be true in the market gardens.

DEPTH OF PLANTING

Peas should be planted from one and a half to two inches deep. If planted three, four, or more inches in depth, is it reasonable to expect the small seed to thrust the stalk and the leaves through this soil and make the proper growth? Sometimes nature will overcome such seeming carelessness in this regard, but if we wish to have the peas three or four inches deep in the home or market garden, why not cover them with an inch of soil, and after the seedlings have come above the ground, gradually draw the soil towards the plant.

MANNER OF PLANTING

Peas planted for canning are generally sown with the grain drill. The older practice seems to be to sow them but one way, across the field, using from two to three bushels to the acre. Modern practice is seemingly better, consisting of planting half the peas in one direction and the other half in the other direction, using at least four bushels to the acre. A larger yield of peas is obtained this way, as well as a more uniform stand. Sometimes canning peas are sown by hand and harrowed in. In some cases they have been plowed down. The harrowing and the plowing have decidedly objectionable features over the grain drilled peas, the peas not being covered evenly, an uneven stand, waste of seed, etc., but where a man does not own a grain drill, this method may be followed. In the market garden, and in the home garden, the one-row seeder, such as the Planet, Jr., Iron Age, Columbia, and

Genung may be used, the peas being planted at certain depths and certain distances being utilized between rows. Sometimes the gardener will plant the seed by hand, first opening the furrow with a hoe and dropping the seed in this furrow, covering and pressing the soil over the seed. This is a good method where the garden is small.

BROADCASTING

The principal objection to broadcasting is the fact that poor soil preparation and insufficient covering is generally given, resulting in smaller yields.

CULTIVATION

Where the pea crop is grown for canning, no cultivation is given. Therefore, the preparation of the land should be most thorough. In the market garden, cultivation should begin early and should be frequent; in fact, some men think it advisable to pass through the crop at least every five days. This would be a good practice for the home gardener. The pea crop requires about four hundred and seventy-seven pounds of water to produce one pound of dry matter. It is, therefore, very evident that cultivation is necessary to conserve moisture in the soil. Shallow culture is always advisable. The roots of the plant come so near the surface of the soil and spread so far that deep cultivation will be the cause of great injury.

Where tall sorts of peas are to be grown, some support is necessary. Such support may be given by the use of brush or chicken wire, or a trellis made with strings. For practical purposes, the chicken wire seems to be the best. Canning peas are not given support. The home or market garden may include tall sorts.

HARVESTING

As soon as the pods are ready and the inspector has given the word, the vines should be harvested. They may be cut with a scythe or a mowing machine. Where the latter is used, an ordinary hand rake may be used to collect these, and men with forks may follow and place them in a windrow. From this windrow they are placed in the wagon. The peas may be harvested with a swather, a tool particularly adapted for work on large areas.

This is a special machine having long-fingered guards to lift the vines. These guards are placed on the cutter bar of a specially constructed mowing machine. The knives of the machine cut the vines, which are rolled by specially constructed arms so that the pea vines will be left in a swath. Ten acres per day under favorable conditions can be harvested with machines of this type. Where an ordinary mowing machine is used, a side delivery rake is often employed, leaving the vines in a windrow. Immediately following this side delivery rake, hay loaders are used which place the vines upon wagons. Where a hay loader is not used, the pea vines are thrown in the wagon by hand, similarly to loading hay. The vines are then carried to the cannery or viner.

MARKET GARDEN

The peas are separated from the vine by hand and the pods collected in hampers or baskets. Some gardeners make but one picking, tearing up vines and all and separating the pods from the vines. The vines are dried and used for hay. Other men make two or three pickings, at each time removing only the largest pods.

The average price for picking a bushel of peas varies, according to the labor supply and the heaviness of the yield, from fifteen to twenty-five cents per bushel. It would be a good practice for the harvesters to grade the peas as they are picked at least into two grades, the first being the highest quality and others culls. The baskets containing the peas should be sealed at once and shipped immediately. Pre-cooling is desirable, because the crop heats easily. If this crop is slightly moist when harvested, cars will heat and often arrive at their destination in poor condition.

HOME GARDENING

The peas are harvested in the home garden by hand, the peas being carefully separated from the vine. Only peas of plumpness should be taken, thus assuring those fit to eat and of the highest yielding. Several pickings can be made from each variety, and, if a succession is planned, pods will be available over a long period.

YIELDS AND PRICES

From 1,500 to 2,500 pounds of shelled peas per acre are often obtained from canning peas. As much as two tons have been obtained under very favorable conditions. The market garden averages about 75 to 150 bushels per acre of unshelled peas according to the method of planting and the variety. In the home garden a row about 100 feet long would give three to five bushels of pods. Of course, this will vary with the variety and other conditions.

Canneries pay from two to two and one-half cents a pound for shelled peas. Lately there has been a system of paying introduced into some canneries where peas containing no hard or extremely large sorts bring as high as three cents a pound. The peas grade from this down to as low as one and one-half cents a pound, this price being paid for peas containing hard seeds and varying sizes. In the market garden three dollars or a little more per bushel is sometimes received, and the price soon drops to as low as fifty cents a bushel or less. The earlier and larger the pods, the higher the price.

COST OF PRODUCTION

As a general rule, the cost of producing an acre of canning peas varies from thirty to forty-five dollars. That includes all the work connected with the crop. In the market garden, the cost of this crop varies from forty to seventy-five dollars, according to the methods of planting and the yield. The profits from a canning crop are generally very limited. In many localities in New York State there is a dead loss instead of profit. If a man is able to obtain a profit of fifteen to twenty-five dollars per acre, he should be satisfied. In the market garden, from seventy-five to one hundred dollars profit is received at times. A man receiving fifty to seventy-five dollars for the crop and following on the same land with another vegetable in the same season should be satisfied.

INSECTS

Pea weevil.— The pea weevil is one of the most common insects. This is a beetle of brownish gray color having two black dots near the anal part of the body. Its head is bent under the

body and ends in a sharp snout. The insect is quite common when the peas are in bloom. It deposits an egg on the young pod. The grub enters and eats its way into the interior of the pod, entering the pea. The insect remains within the seed throughout this larval stage and also through the pupal stage or rest stage, coming out in the early spring after the seed has been planted, as a beetle, to lay more eggs. The remedy in controlling this insect is to use bisulphide of carbon to fumigate the seeds. The way to do this is to place 100 pounds of seeds in a tight barrel or bin. Use one ounce of bisulphide of carbon, pouring the same over the seeds, and close the receptacle tightly. Allow this to remain for some time. The beetle will then be destroyed.

Pea Louse.— The annual loss from this insect runs into many millions of dollars. It is a small greenish-brown insect with long legs, found on the underside of the leaves. It is very tender and, therefore, should easily be controlled. On a small scale nicotine solution such as Black Leaf 40 should be sprayed on the plants, or a solution of kerosene, soap and water. Twenty-five per cent. kerosene should be used. Many birds and insects are its natural enemies. Another method is to cultivate the peas, sending a boy ahead to knock the pest from the vines, then bury these insects with the cultivator.

Blight or Leaf Spot.— This is a discolored area generally found upon the stem near the ground. It is somewhat similar to anthracnose on the bean. The disease works through the pod and to the seed, infecting it. The remedy is self-evident; select seed that is not infected. The vines may be sprayed with bordeaux, beginning when four to six inches in height and continuing about every four to six days. After the crop has been harvested, the vines should be burned, in order to check the spread of the disease.

Mildew.— Mildew is a whitish or grayish coating generally found on the pea leaves late in the season and after the weather has become somewhat warm. The remedy for this particular disease is dusting the affected plants with sulphur. Peas grown on cool sites are less likely to be troubled.

VARIETIES

For canning the Alaska is one of the common varieties. This may be a good source for the canner, but is a very poor eating

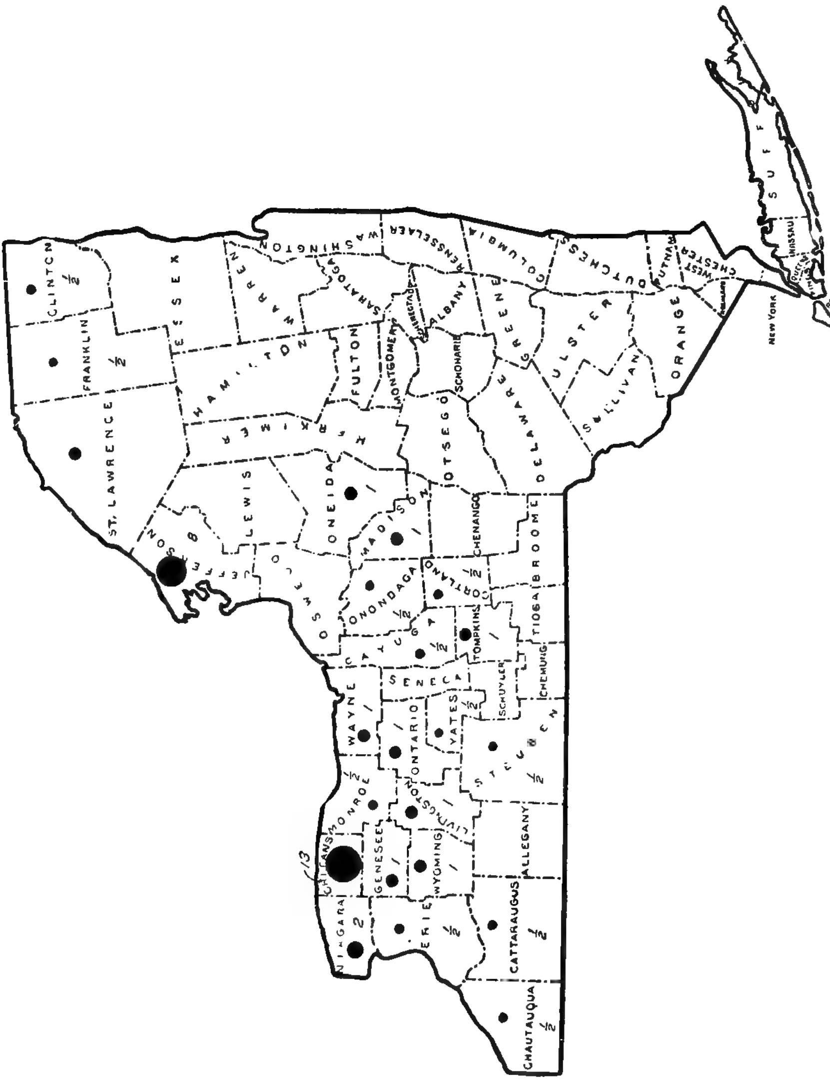

FIG. 458.— MAP SHOWING ACREAGE OF DRY PEAS. FIGURES IN COUNTIES REPRESENT ACRES IN HUNDREDS

pea. The Telephone is a very good variety, the Advancer, Admiral, Duke of Albany, Horsford's, Thomas Laxton, and others. It is a good plan for a cannery to try out different sorts each year, adopting the variety to meet the particular conditions.

For the market gardener, the Alaska, American Wonder, British Wonder, Excelsior, Early Surprise, Gradus, Market Garden, Thomas Laxton, Dwarf Telephone, and Duke of Albany are good sorts.

For a succession I recommend the Early Surprise for early, followed by the Excelsior (do not use the Notts), Thomas Laxton, Dwarf Telephone and Duke of Albany. For the home garden the varieties recommended under market gardening are very good. There are many other sorts which may be valuable, and it is recommended that they be tested out by the individuals.

BEANS

H. E. Cox, Geneseo, N. Y.

I have stated on previous occasions, when this subject has been given me to discuss, that, although I was raised and have always lived in the bean belt and have all my life raised more or less beans, still I can truthfully say that, "I do not know beans." And I think this is true, also, of bean growers generally.

In all our farming operations there is an element of chance, because of conditions over which we have no control. Bean growing is a gamble, but if we have land suitable for growing beans it is "good business" to take the gamble.

In beans we have one of the most nutritious and highly concentrated food products offered by the vegetable kingdom. Their value when cooked as a means of supplying protein in cattle rations is justly recognized, but their value as human food is too great to allow of economical stock feeding excepting where, from weather damage at harvest time or other cause, they have become unfit for food simply by their appearance. Even these beans, when boiled in an arch kettle for the cows and pigs, appear appetizing enough so that a real hungry man would not be injured either mentally or physically by making a meal from that same stew. They were used last winter on our Orchard Ridge Farm, cooked and fed with the ensilage, with excellent results.

A SECTIONAL CROP

Wheat, potatoes, hay, corn and alfalfa are grown quite generally over the whole country. It is interesting to notice how readily conditions can be changed to suit the requirements of alfalfa. On the other hand, cotton, tobacco, sweet potatoes, beans, etc., are sectional crops; that is, they flourish to greatest perfection under certain soil and climatic conditions supplied only by particular sections of the country.

FIG. 459.—BEANS AND CORN IN AUGUST ON FORMERLY UNPRODUCTIVE, UNDRAINED LAND

HISTORY

Not much attention was given to this now great feature in our crop rotation until about the time of our Civil War. Then the demand caused them to be tried quite generally as a field crop in rotation with other crops. It was soon learned by experience that certain counties in this state were naturally adapted to their growth and profitable development, and to this day these localities in this and other states are recognized as bean growing districts. At the present time, the demand for this farm product is so great that they are an unusually profitable crop and efforts to extend their territorial confines are being made with varying

FIG. 460.—A FIELD OF MARROW BEANS NEAR MATURITY, ON MARLBOROUGH FARMS. YIELD, 30 BUSHELS PER ACRE

degrees of success. I know of many sections in our state where heavy crops of corn and other products are grown annually and where beans will not produce a profitable crop. The vines may be in evidence in great profusion but the beans are not there.

COMPARISON WITH OTHER CROPS GROWN

In many sections, especially in Monroe and Livingston counties in New York State, where I am better acquainted with

actual conditions, the yields per acre of wheat and other farm crops have been on the increase, while in these same localities the yield of beans has grown less and more uncertain, excepting under unusual seasonal conditions. A number of years ago I planted thirty acres of beans one year. Some of this land was sod, but most of it had grown beans, corn or potatoes the previous year. The season was ideal, and an average of thirty bushels to the acre was the result. I began to think that I "knew beans." The next year I planted about the same acreage. The season was just the reverse of the preceding one and about twelve bushels to the acre was the result, and these not first quality.

PREPARATION OF LAND FOR BEANS

This should not be left until the year we wish to plant the crop, for the first preparation is a good sod — a clover sod is preferable.

As to time of plowing the land: if the soil be of the heavy order, late fall or early spring is the best time, although good crops are often grown when the plowing has been delayed until quite late in the spring — but this is an exception to the general rule. Lighter soils should be plowed in time to give the land thorough preparation. If a heavy application of manure has been given the sod direct, it is better to grow a crop of corn the first year and follow with beans, then wheat, and seed again, making a four-year rotation. There is no better implement for levelling and firming the ground than the plank drag or old-fashioned clod brusher. This implement removes any humps in the furrows and deposits them in the spaces between, as well as filling up the deep holes made by the horses' feet, and these holes and depressions mean a big item, taking the whole field into consideration. If they are left as the roller leaves them, they must be filled by the harrow with loose dust, and an even, firm undersurface is not possible. Beans need this in order to get an even start — a very important first step. A roller presses heavily on the highest spots and does nothing at all to the little hollows and holes. Up to this point, if the furrows have been leveled and firmed the same day they are turned over so as to better conserve the moisture, with the soil in good heart and the harrow used often up to the time of planting, we have so far done our part toward giving the crop a good start.

WHAT KIND OF BEANS TO PLANT

This question must be settled definitely by the rule of cut and try, although there are some general rules. Without question the variety known as pea are best adapted to the lighter loams and sharp gravelly soils. Beans of any variety do not produce well on leachy soils or soils over-saturated with water. The varieties of red beans are best adapted to heavier and darker soils as are also the white marrows. This latter variety is produced profitably on a much smaller area in the bean belt than are the other sorts. There is a section in Livingston county where these are raised more than any other kind.

SEED BEANS

A great deal depends on the selection of the seed. If there is a crop that one has seen growing and knows about, that has escaped the diseases so often affecting it, it will pay in dollars to secure such seed at any price within reason. There are sections where, for different reasons, the crop is practically healthy and from which seed can be procured through reliable parties. Produce firms dealing largely in this crop often have shipped in a carload or two of such seed for the use of the growers whose crops they handle, and I have seen the yield doubled by such change of seed. I have had personal experience to verify this fact.

QUANTITY OF SEED

There is a wide difference in the quantity of seed used to the acre. Many believe that thick seeding increases the yield. I firmly believe that, if the land is in proper heart and adapted to bean growing, as much in quantity and of better quality can be grown if the plants are not crowded in the row. The rows are usually 28 inches apart. In my own opinion sixteen or eighteen quarts of pea beans and thirty-two to thirty-four quarts of the large beans, according to variety, are sufficient where conditions are right. We have noticed that when a bean plant grows alone, the pods are more numerous and the individual beans are of larger size.

FERTILIZING

There can be no general rule as to the make-up of a fertilizer for beans. All soils differ in their requirements. Even differ-

FIG. 461.—FIELD OF RED KIDNEY BEANS ON FARM OF R. C. BROWN, HOOSICK, RENSSELAER COUNTY, SHOWING THE POSSIBILITIES OF THIS CROP IN EASTERN NEW YORK

ent fields on the same farm need different fertilizers. The first essential is to have a good sod as a foundation; then vary the analysis according to how the land has been treated previous to the sod condition, and, if a fertilizer is deemed necessary, let the percentage of phosphoric acid predominate. Still, many advocate high-grade goods and use them, such as 4-8-10 and 4-10-4. Theoretically, this formula should give results; practically, the expected results do not always materialize.

I recall two fields of white marrow beans growing on opposite sides of a highway this past season. They were both given about the same start as to soil and preparation. On one field a 10-8 fertilizer was used and on the other barnyard manure was spread during the fall and winter and no fertilizer used. The first field ripened early and yielded about ten bushels to the acre. The second field was about a week later in ripening and yielded twenty-three bushels to the acre. This field was planted the twelfth of June.

I have talked with a great many bean growers and have asked them this question: "When you left strips across your fields where the fertilizer was not used, did you notice any difference in appearance or yield between these rows and those where you used the fertilizer?" The answer has invariably been, "No, but I have seen the crop injured in dry seasons by fertilizers." Then I ask: "Have you been using it in this way on wheat?" The answer is, "Oh, yes, and could see good results even on the grass that follows the wheat." This confirms my own experience, and right there is the place to use the fertilizer; we always get results from its use. But for beans, the place to use it is on the sod previously, not directly on the bean crop. Let the nitrogen or ammonia get toned down by the grass crop. Then the three ingredients of a complete fertilizer will be present — nitrogen, phosphoric acid and potash. Enough of the latter will be rendered available for the requirements of the growing crop.

If a fertilizer is used let it be drilled over the whole surface of the field previous to planting the crop. It is the general experience with us, in this section of the bean belt, that land that has always been wet and unproductive will, after drainage, produce heavy yields of beans. Usually a crop of corn is raised the first year on such lands, for this has always been the great pioneer crop. It seems to whip the soil into its normal condition. I have one

field in mind where conditions had long been considered hopeless. The first year after drainage, the crop planted was very poor. It was then given an application of barnyard manure. This treatment acted as a tonic on the soil, and good beans as well as other crops have been the record on that field ever since.

PLANTING AND CULTIVATION

When soil and season conditions are normal, from the tenth to the twenty-fifth of June is the usual time for planting. If, for any cause, the crop is planted unusually late, either the pea

FIG. 462.— BEANS ON THE FARM OF M. C. BURRITT, HILTON, MONROE COUNTY, N. Y.

or yellow eye varieties should be used, as these varieties require a shorter season for growth and ripening. When conditions are right the rows of beans usually show up in four or five days, if not planted too deep — not over one and one-half to two inches. I have cultivated field beans six days after planting, but this was a little out of the ordinary.

No crop that we grow responds more readily to cultivation than does the bean crop. If other work presses, it will pay to hire extra help to keep the cultivators moving from the time the rows can

be nicely seen until they are well in blossom, and sometimes when the pods are forming. Why? First, because by the use of shields, the first time over one can run quite close to the row and not injure the roots of the plants, and, for the same reason, he can go deeper. Again, it stirs up and covers up the little weeds which at that stage in their growth are easily destroyed. Cultivation prevents a crust forming, lets the air into the soil, and attracts and conserves moisture. At the second cultivation, the teeth or steels next to the row should be set more shallow, and after that the cultivation should all be shallow. Often a crop of beans is badly injured by deep cultivation thoughtlessly done, for the fine feeding roots extend across the whole intervening strip, occupying the entire soil. Cultivation should never take place when the vines are wet, because in that condition the disease spores are scattered if they are present, causing great damage.

HARVESTING

It is a good plan to let the crop get quite well and evenly ripened before cutting. Ordinarily there is not much danger by shelling. The cutter turns two rows together. A side delivery rake is often used to roll four of these rows together, two going across the field and two coming back. In this way we have eight single rows in one. After lying in the windrow a few hours they can be cocked up as hay, keeping the bottoms of the cocks well tucked under so as not to have so much base. Thus they will be safer from weather damage, will cure faster and better, and can be pitched on the wagon and hauled out of the field in half the time. The bunches are usually turned over a few hours before hauling to give the bottoms a sunbath. In any event the crop must be dry and hard before being put into the barn or stack, or damp beans will result, and it is a very difficult task to dry them after threshing. There should be one ironclad rule in harvesting — never leave a load of beans in the field one minute after they are ready for housing, for no crop is more damaged by bad weather than is the bean crop, and with no other product is greater loss entailed. It is a discouraging job to turn and re-turn beans in the field, being all the time conscious that this loss and worry could have been avoided by a little care in management.

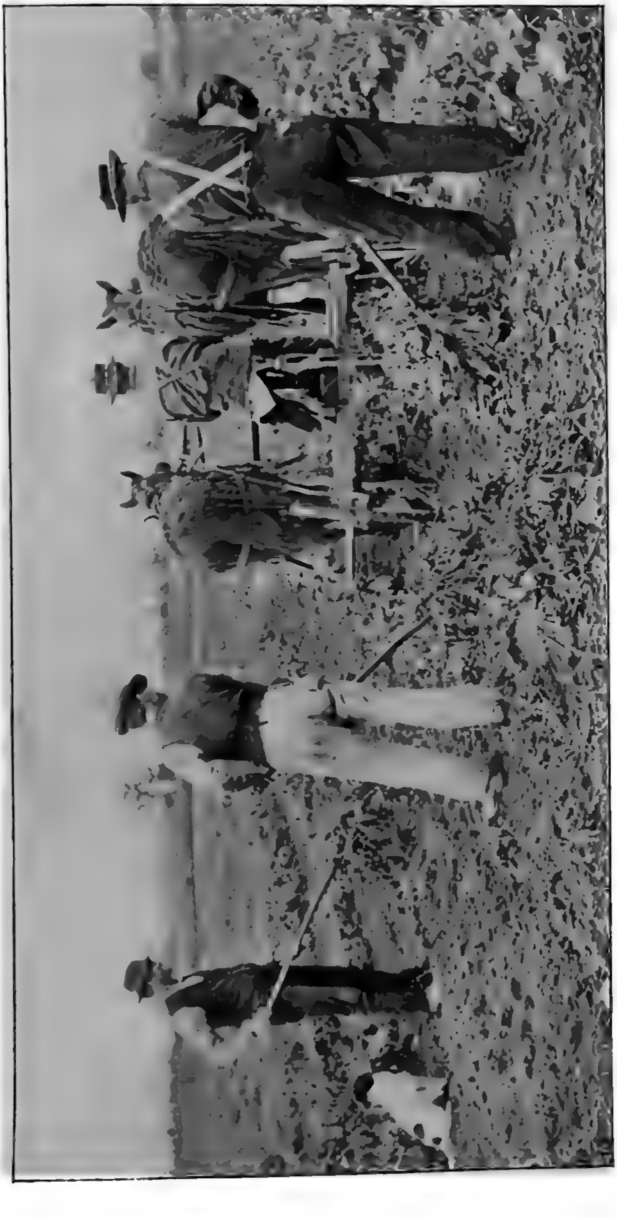

FIG. 463.—BEAN HARVESTING ON THE FARM OF M. C. BURRITT, HILTON, MONROE COUNTY, N. Y.

THRESHING AND MARKETING

On large farms, where there is plenty of help of both men and teams, threshing from the field is sometimes practiced, but this is not general or to be recommended for we are never sure what kind of weather to-morrow may have in store for us, and beans must be threshed when dry. Very little splitting of the bean occurs where the modern double cylinder bean thresher is used. In new localities where there are not enough raised to afford such a machine they can be trodden out with horses smooth shod or bare hoofed. I have assisted in threshing many hundreds of bushels in this way during the earlier stages of bean growing in Monroe county.

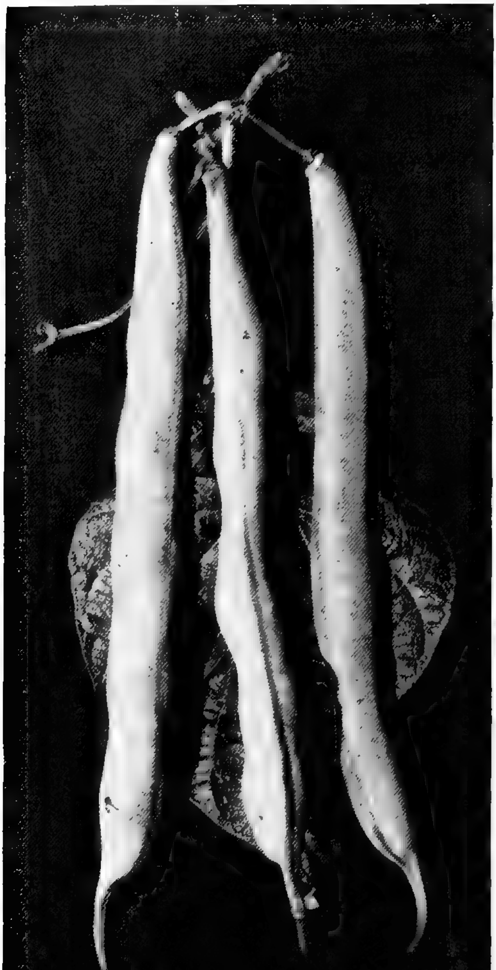

FIG. 464.— WELL-FILLED BEAN PODS

When we as farmers get a crop of any kind ready for market I believe that, covering a term of years, we are money ahead by selling just as soon as the market is right. It is much safer to hold on, if we must, when the price is low, but it is not good business, all things considered, to hold because prices are booming.

YIELD OF BEANS

The yield of beans varies from five to thirty-five bushels to the acre, according to adaptability of soil, variety of beans and seasonal conditions. In the older bean growing sections both the acreage and yield per acre is much less than formerly. Last year in our best bean section there were more ten-bushel yields than twenty. Here again we "don't know beans," for on these same fields and farms wheat and other crops yield as good, and in many instances better than formerly. Hundreds of acres of bottom land in the Genesee Valley that in former years could be counted on for big yields are now given over to grass and cattle, for beans are not profitable any more on these lands. New territory for growing this crop is being tried out with more or less success. This one thing is certain: any farm product that brings in such good money in so short a time will eventually cause the removal or correction, to a great degree, of adverse conditions and influences that now handicap its progress.

DISEASES OF BEANS

The principal diseases affecting beans in field culture are anthracnose or pod spot, rust and blight, the first being the most destructive. These are fungous diseases and as yet the station experiments have not shown that any treatment of plant or seed will prove of practical usefulness in controlling the trouble. The seed from a pod that is free from disease, planted on ground that is not infected with the spores of disease left over from previous crops, will produce crops free from disease. Blight and rust we have long had to contend with. These are mostly confined to the foliage and are more disastrous to the crop in hot, moist seasons. No treatment of the seed has yet proved of any value in controlling these diseases. Pod selection is the only preventive.

AFTER CROP CONDITION OF THE SOIL

As we have referred to soil preparation and conditions preceding the bean crop, we will now consider the aftermath. If the crop has been properly cultivated, what few weeds escaped destruction have been cut out by the bean harvester, and the land is in the best possible condition for wheat seeding after being gone

over a few times with a spring-touch harrow. This gives a better preparation all through than was afforded by the summer fallow practice which was the usual method of preparing land for wheat before the advent of beans as a field crop. With a well tended bean crop we are summer fallowing and at the same time growing a cover crop that pays all the expense and usually much more. The benefit in either case is from the shade and thorough tillage given the land which brings the humus in the soil to a condition avoilable to plant growth, and beans being of the trifolium order of plants, or a nitrogen gatherer, the soil is left in better condition as regards this element. Now with wheat and seeding, after a bean crop, the sod begins again to furnish new material for humus, and will be ready for the bean crop in rotation.

SUMMARY

Profitable bean growing depends upon the following:

1. The adaptability of the soil conditions, or the possibility of correcting adverse conditions.
2. The previous management of the field, and a thorough preparation of the soil.
3. If a fertilizer is used, let it be after a careful study of conditions. Use it on the wheat preceding so as to insure a good sod. In this way thousands of dollars could be saved bean growers.
4. Cultivate thoroughly, but after careful study of the plant's requirements.
5. Plant in rotation on sod, or after corn that was grown on sod.
6. Harvest when fully ripe and house when dry enough to admit of storing.
7. Do not become a speculator unless you can afford to. There is a positive loss in shrinkage, and often unheralded changes in market conditions.

GARDEN BEANS

A friend of mine who is at the head of a large seed house tells me that there are about seventy-five varieties of garden beans that are worthy of selecting from, having all combinations of colors from pure white to ebony black, and many of them beautifully spotted.

As with the field sorts, some kinds are better adapted to certain soil conditions than others. The yellow pod varieties are popular in the north, while in the south the green pods are more in demand. Perhaps they are better adapted to conditions there. The Early Valentine is a green pod sort and a good yielder. The Golden Wax or butter bean is a general favorite for the home garden. The pods are yellow, well filled and are a stringless snap. The dried bean is about the size of a field medium, with a white back, while the eye side of the bean is a speckled purple and white.

FIG. 465.—A FIELD OF BEANS CURING IN THE COCK. THE WASTE LAND HAS SINCE BEEN DRAINED AND THE WATER PIPED TO FARM BUILDINGS. THAT PART OF THE FIELD NOW RAISES THE HEAVIEST BEAN CROP

Then there is another bean that was kept in stock at our local stores last season and was quite generally planted. It is called the Hodson Wax Pod, a speckled red and white bean about five-eighths of an inch in length. It is a later bean than the Golden Wax or butter bean and has proved to be a very strong grower and a heavy yielder. I had four varieties in my garden the past season (1914) and this was one of the best of the four. If they would yield in the field as they did in a neighbor's gar-

den they ought to reach twenty bushels to the acre. I am told this sort is grown to quite an extent by market gardeners, as the pods, being nearly six inches long, measure up well for the market.

Among the other excellent garden beans are Round Pod Kidney Wax, Davis Wax and Flagalett Wax. The pods of this sort are long and quite large. The dried beans are a dark blue black and longer than the butter bean. These yellow pod beans that I have grown in my garden have given satisfaction, and there is very seldom any sign of disease. The old and well-known Cranberry, a large, round, red and white speckled bean, needs no description here. It is not as popular at present as some of the newer sorts. I have raised the Black Wax, Refugee and Valentine as a field crop, on contract for a seed house, but the yield was too light for a continuation of this practice. I am told that the yield of field grown garden beans is decreasing and that five or six bushels is about the average. The price has been around $4.00 a bushel, but as the 1914 crop was short it looks as if we would receive $10.00 a bushel for seed garden beans grown on contract.

LIMA BEANS

Perhaps the best early bush lima is the Fordhook. This variety followed by Wood's New Prolific will give a prolonged season for this delicious garden bean. Bush limas are in every way as good as the pole varieties, and for that reason are rapidly superseding them.

CONCLUSION

Where conditions will allow of profitable bean growing, this is a very desirable crop to raise; first, because of a quick money return, and, second, because the crop, if properly cultivated, will leave the ground in fine condition for wheat and seeding to grow, and the bean haulm makes a valuable addition to the coarse fodder for stock in winter, even for milch cows, if fed once a day.

Then, again, a farm without a garden is sadly incomplete; and a garden without a succession of vegetables, especially beans, is surely unbalanced. Always having been used to a good garden, I cannot picture a real country home without this economic and educational department.

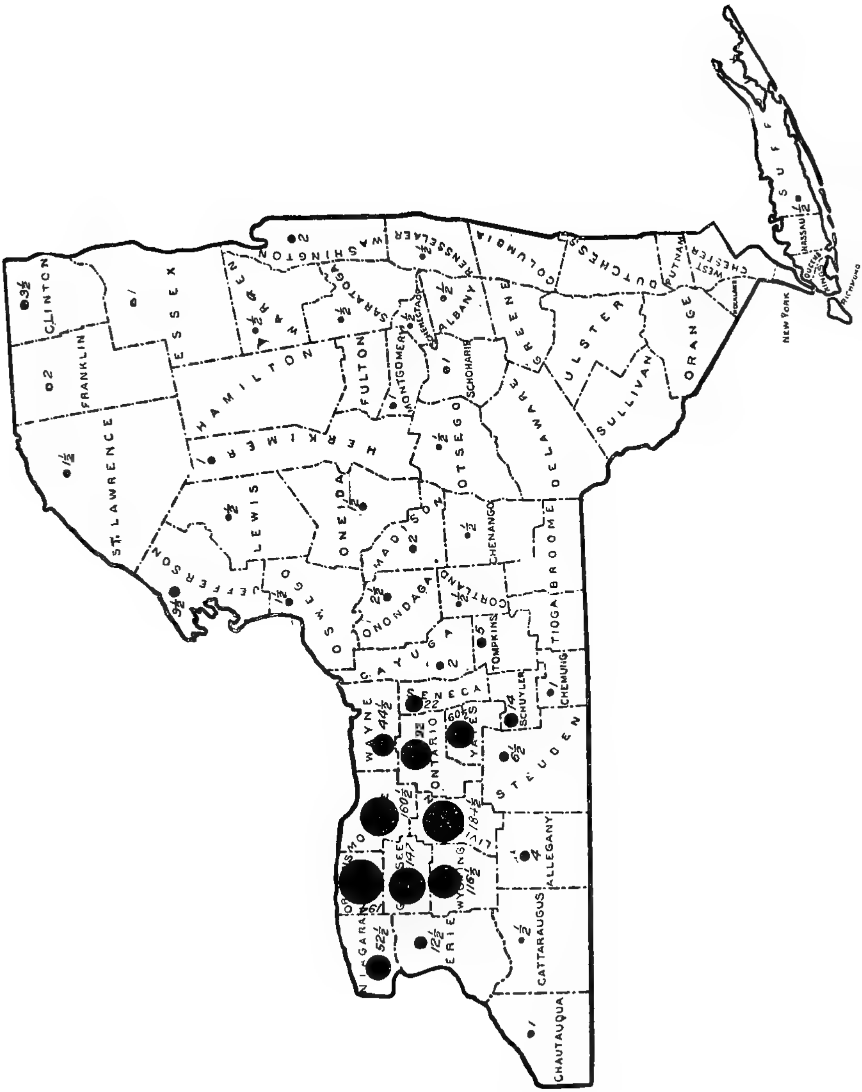

FIG. 466.—MAP SHOWING BEAN (DRY EDIBLE) ACREAGE. FIGURES IN COUNTIES REPRESENT ACRES IN HUNDREDS

LETTUCE

W. L. Bonney, Batavia, N. Y.

MAGNITUDE OF THE INDUSTRY

It is within comparatively recent years that the growing of lettuce commercially — that is, in car lots — has become a business proposition among the market gardeners of the state.

There is probably no other vegetable the production of which has increased so rapidly as that of lettuce. There are two reasons for the wonderful growth of this industry. One is a growing demand for this healthful and delicious vegetable, and the other, the rapidly increasing development of the muck lands of our country, in which soil lettuce seems to reach perfection.

The acreage planted to lettuce in this state is very large and is increasing each year. It now takes in South Lima, Livingston county; Arkport, Steuben county; Sanborn and Middleport, Niagara county; Williamson, Wayne county; Fancher and Holley, Orleans county; Fulton, Oswego county; and the muck lands near Syracuse, Onondaga county; Canastota, Madison county, and Chester, Orange county. In fact in every section where muck lands are being developed a large portion goes into lettuce.

VARIETY AND SEED SOWING

There are a great many varieties of lettuce, but we feel safe in saying that 90 per cent. of all outdoor lettuce (of which this article is treating), is the Big Boston.

The seed of this variety may be sown as early in the spring as the ground can be fitted for the purpose. The ground should be prepared as follows: after plowing the land in the spring, sow broadcast a high-grade fertilizer and work well into the soil. Sow the seed with a garden seeder in rows fourteen inches

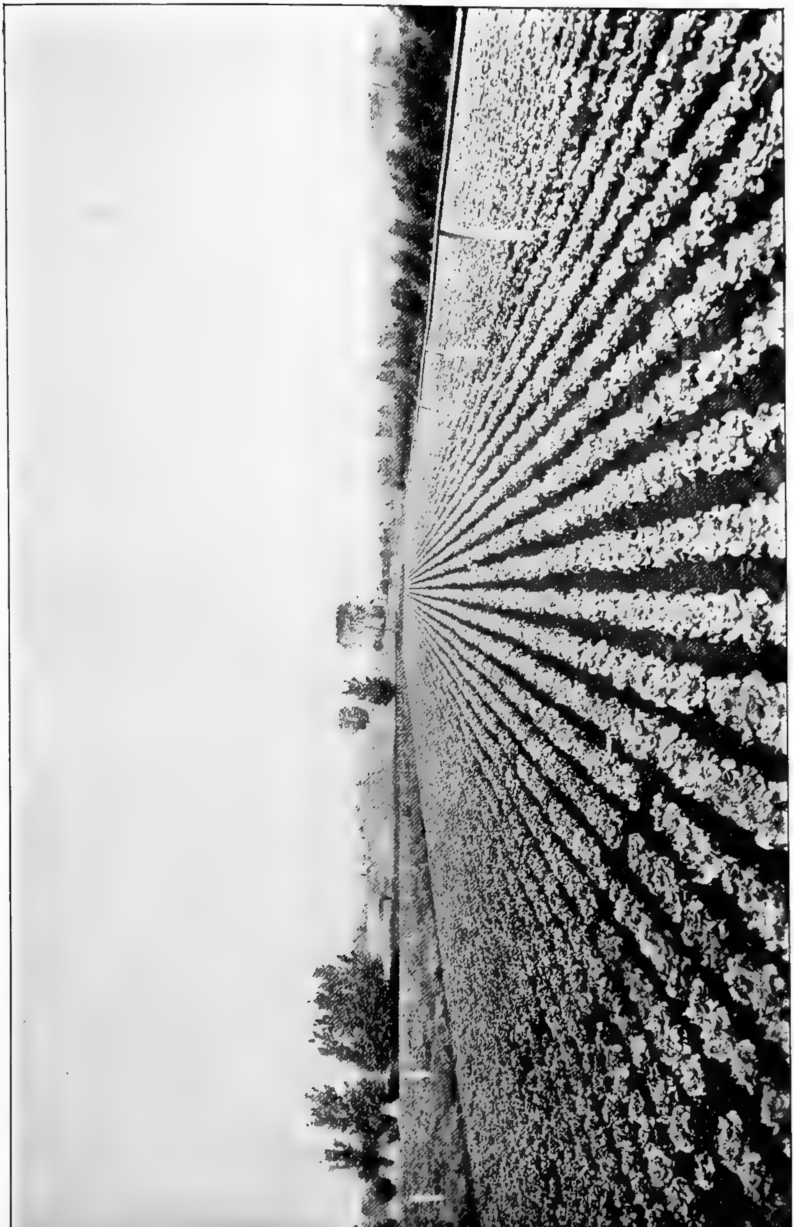

FIG. 467.—LETTUCE GROWN ON MUCK LAND

apart, at the rate of from one to two pounds per acre, depending upon the amount of moisture in the soil. Should the soil be very dry the seed may be soaked until sprouts appear, then dried quickly and sown. When plants have their second leaf, thin to twelve inches in the row. These sowings may be continued a few days apart throughout the entire season.

CULTIVATION

Start cultivation as soon as the rows can be seen distinctly, using some of the many wheel hoes for this purpose. Continue these cultivations as long as possible without injury to the plants. No one tool will do satisfactory work under all conditions. We use various types of wheel-hoes as well as hand-hoes, since conditions may vary. We also hand weed whenever necessary.

Lettuce is a very rapid grower, and is usually well headed in seven or eight weeks from time of sowing, except late in the fall.

CUTTING AND PACKING

The common butcher knife is used for cutting and removing all soiled and diseased leaves from the heads, which are placed in a hamper. These hampers are carried to the lettuce bench where the heads are sorted and packed in boxes and hampers according to grade.

The box used is 16 inches wide, 23 inches long and 8½ inches deep. This holds two dozen heads of No. 1 lettuce and thirty heads of No. 2. The No. 3, or third grade, may be packed in the regular half-barrel hamper.

To obtain the best results in getting the lettuce to market in a crisp, firm condition, it should not be packed in the hot sun. On hot, sunny days, cut early in morning and late in afternoon and take to the packing shed to sort and pack.

SHIPPING

Before loading, cars should be cooled by having ice boxes filled twenty-four hours before the lettuce is put in. Place five boxes in a row across the car, dividing the space, which leaves three or four inches between the boxes. Pack these boxes five high with one-inch strips between each row. A car will accommodate about

four hundred boxes. The hampers may be placed on top of the boxes in the ends of the car, near the ice chests. See that the latter are filled before starting and keep well iced in transit.

MARKETING

The marketing of this as well as other perishable crops is a large factor governing either the success or failure of the proposition.

FIG. 468.—A WELL-DEVELOPED HEAD OF HANSON LETTUCE. THE PLANT IS OVER A FOOT ACROSS

There are two ways in which the marketing may be done: contracting the entire crop at the beginning of the season, or shipping on commission. Occasionally a buyer will purchase a crop in the field when it is ready to be moved. Which of these methods is the best is a question which every grower must decide for himself. If he can contract at a fair price to a thoroughly reliable party, he is sure of a market for his product; but if the "high spots" in the market outnumber the "low" ones he will do better to sell on the open market.

A WORD OF WARNING

To those who have never played "the lettuce game" but are contemplating doing so, we would like to make a few suggestions: Fertilize and prepare the ground carefully; spare no time or expense in caring for and working the crops thoroughly; have in readiness all the necessary packages and equipment for shipping a maximum crop. While doing this, cultivate that sweet, sunny disposition which will enable you to smile as you quietly tell your man, "Plow under the whole crop," when you notice some morning that it has "all gone wrong." Or, if you are fortunate enough to escape all the lettuce diseases and harvest a banner crop of elegant heads which fill to bursting your boxes, you must be optimistic enough, on receipt of the following wire

from your commission man — "Lettuce arrived in bad shape, market very low, will have to dump car. Please send check to cover charges," to reply by night letter, sending check to cover freight — "Sorry market is off, have another car loaded, three more must be cut immediately, do best you can."

Some growers have been fortunate enough to grow maximum crops and get high prices, but most of us have to be satisfied with a very modest average price. Someone has wisely said: "After a man has successfully encountered the bulls and bears of Wall street he is just ready to enter the lettuce business."

Another philosopher has very sagely advised: "If you contemplate going into the lettuce business, do not do it; buy a cow instead."

It's an easy crop to harvest,
And a lovely crop to grow,
It may fill your purse with dollars
Or your heart with bitter woe.

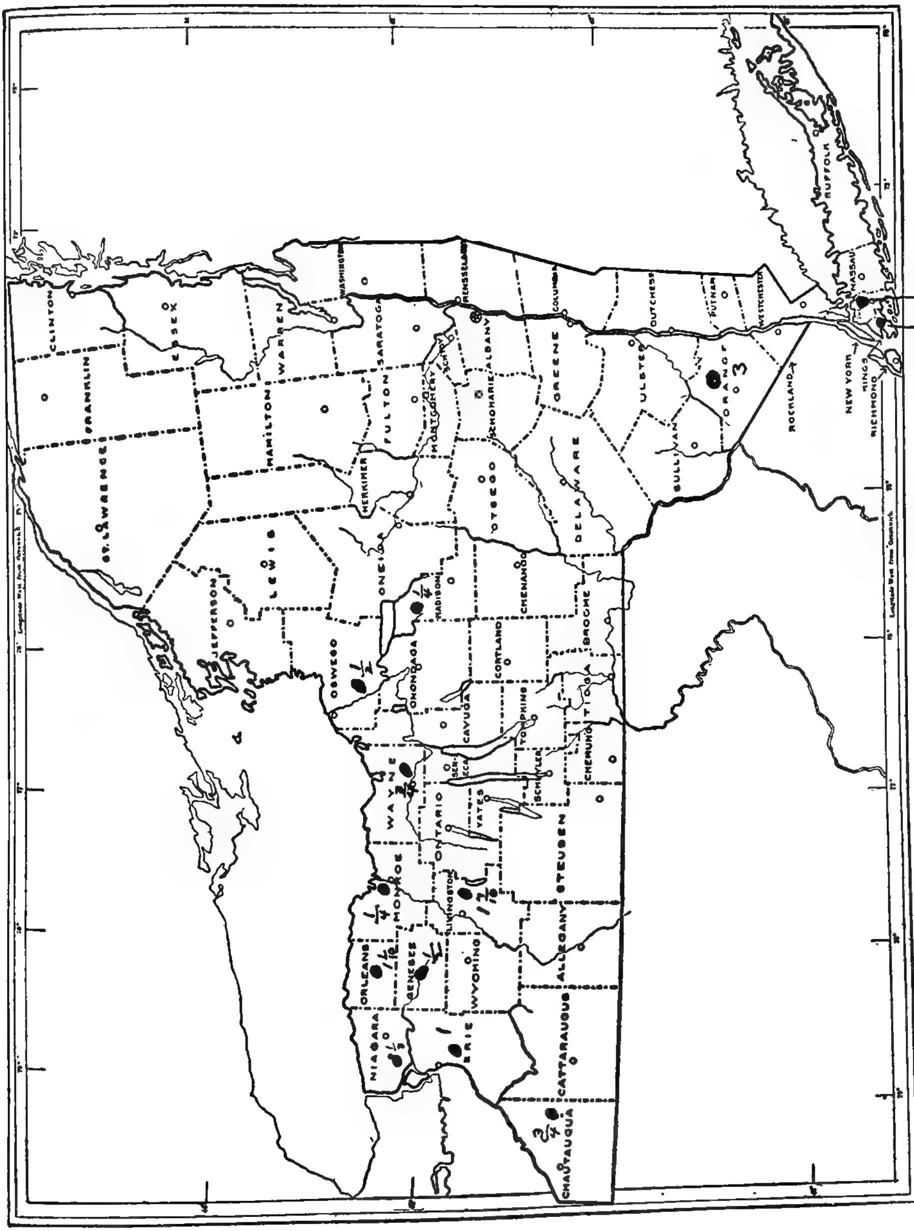

FIG. 469.— MAP SHOWING LETTUCE ACREAGE. FIGURES IN COUNTIES REPRESENT ACRES BY HUNDREDS

ACREAGE AND VALUE OF LETTUCE GROWN IN NEW YORK STATE, BY COUNTIES

(Taken from U. S. Census 1910)

County	Acres	Value
Albany	11	$3,215
Allegany	....	....
Bronx	....	....
Broome	2	2,500
Cattaraugus	....	....
Cayuga	2	500
Chautauqua	5	800
Chemung	....	....
Chenango	....	....
Clinton	....	....
Columbia	....	....
Cortland	....	....
Delaware	....	....
Dutchess	....	....
Erie	99	17,811
Essex	....	....
Franklin	....	....
Fulton	....	....
Genesee	20	4,300
Hamilton	....	....
Herkimer	....	....
Jefferson	....	....
Kings	31	5,930
Lewis	....	....
Livingston	166	40,489
Madison	....	....
Monroe	25	4,368
Montgomery	....	....
Nassau	16	2,300
New York	1	40
Niagara	12	3,200
Oneida	5	700
Onondaga	6	$3,100
Ontario	3	439
Orange	303	90,939
Orleans	108	41,810
Oswego	9	3,633
Otsego	....	....
Putnam	....	....
Queens	143	46,120
Rensselaer	....	....
Richmond	15	5,000
Rockland	....	....
St. Lawrence	....	....
Saratoga	....	....
Schenectady	....	....
Schoharie	....	....
Schuyler	....	....
Seneca	2	115
Steuben	....	....
Suffolk	....	....
Sullivan	....	....
Tioga	....	....
Tompkins	....	....
Ulster	4	1,000
Warren	....	....
Washington	....	....
Wayne	21	8,350
Westchester	3	2,400
Wyoming	....	....
Yates	....	....
The State	1,012	$289,059

SWEET CORN

A. E. Wilkinson

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Sweet corn is a native of America, but has been introduced into other countries. It is one of the most important garden crops in many parts of the United States, being grown largely both for immediate consumption and as a canning crop. It delights in warm weather, although it is more successfully grown in the northern parts of the United States than in the southern.

SOILS

Sweet corn seems to be cosmopolitan as to its soil requirements. It does best on a fairly rich loam. It is not advisable to plant it on soil which is too hard or clayey, and therefore rather backward, as satisfactory results may not be obtained. Sandy or gravelly loams, or even a silty loam, will give very good results, especially if they are prepared deeply. In the rotation, corn follows any other crop very satisfactorily. As a general rule, corn is grown where sod, preferably clover, has been inverted.

PLOWING

The land should be plowed deeply, early in the spring. Six and one-half to seven inches or even deeper is none too much. Care should be taken not to incorporate too much of new subsoil with this top soil, from one to one and one-half inches being sufficient in any one year. Following the plowing, thorough harrowing should be given; that is, the ground should be gone over three or four times rather than only once. Good tools for this work are the disc harrow, used twice over the piece, followed by the spike-tooth used several times. If the land is plowed early, especially sod land, and thoroughly harrowed, a larger amount of water will be conserved, particularly if harrowing follows soon after each rain.

MANURE OR FERTILIZER

Where manure is available, from ten to fifteen tons per acre applied broadcast is advisable. Where the soil is of a relatively heavy type and backward, application of fertilizer in addition to manure is advantageous, using two hundred and fifty to five hundred pounds of a high-grade. Where manure is not available, a fertilizer containing 4 per cent. nitrogen, 8 per cent. phosphoric acid, and 5 per cent. potash, applied in the hill at the rate of about five hundred pounds per acre, will give satisfactory results. This fertilizer would be of greater value where a sod had been inverted than on bare ground.

VARIETIES

Canning

In the eastern United States for an early corn the variety used for canning is the Improved Crosby. This is a second early corn with an ear of fairly large size and very choice kernels. Owing to its earliness the grower is practically assured of obtaining a crop. Stowell's Evergreen is the standard late corn for canning. Very large ears and white kernels of high quality are its characteristics. However, in the last two or three years, owing to the early frosts in the fall and the length of season required to grow this corn, it has proved a failure. Country Gentleman is a good type of corn where shoe-peg kernels are desired. The ears are fairly large and the kernels deep, being placed irregularly on the cob. For the best results where one must consider the season, in order to obtain corn for canning, it would be advisable to depend upon early sorts rather than late. It is well to take advantage of improved types of seed.

Market Gardening

The market gardener has a long list of varieties from which to choose. Only a few will be given here.

Extremely early: Peep-o'-Day, First of All, Red Cob Cory, White Cob Cory.

Second early: Improved Crosby, Squantum.

Main season: Black Mexican, Kendall's, Country Gentleman.

Late: Stowell's Evergreen.

Other sorts may be as good or better. Each grower should test them and select the best for his conditions. Many growers do not care to purchase seed, but raise their own, often obtaining a strain that for their conditions is far superior to any sort they can buy.

Home Gardens

The home gardener may choose any of the sorts mentioned above or from any of those recommended by reliable seedsmen. Many home gardeners are favoring a yellow sweet corn. The Golden Bantam or its improved selection may be used to supply this taste. Plantings in succession of just this one variety should give corn throughout the period desired.

PLANTING

Where corn is to be grown with horse culture, the rows should be from thirty to forty-two inches apart, five or six seeds being planted in a so-called hill, the hills being from eighteen to thirty-six inches apart in the row. Later, thin so that but three strong stalks remain in each hill. Where all hand work is to be practiced, the rows may be somewhat closer — from eighteen to twenty-eight inches apart — and the hills may be the same distance apart in the row as mentioned for horse culture. In some instances planting in rows and later thinning plants to one foot apart may be practiced. The seed should be planted not deeper than one and one-half inches; one inch is even better. Straight rows should be insured by the use of horse or hand-drawn marker, or even on a small scale with the garden line.

Corn should not be planted too early; as a general rule not until after danger of frost is past, probably May 15 to June 1, or even a little later in some locations. The late planting will give ample opportunity for the soil to warm up. The seed may be planted by hand, the grower passing down the row, and, by the use of a hoe, removing a small portion of dirt where the hill is to be located. Fertilizer may be placed in this excavation followed by a little soil. Three to eight seeds are then dropped over this soil, covered and firmed. Pressure of the soil should be given against the seed. It is posible to use the man-power drill machines for planting, dropping seed either in hills or drills. Where these

machines are used, the fertilizer would have to be broadcasted by hand or otherwise. Where the ordinary farm corn planter is available, this may be utilized. For large areas a two-row, two-horse planter is a very practical machine to use. It is sometimes greatly to the advantage of the grower to use the hand method, owing to the fact that the patch may be marked out in two ways, and the corn planted at the intersection of these marks. It is then possible to cultivate both ways, resulting in a decreased amount of hand hoeing, or none at all.

CULTIVATION

Clean culture should be given at all times. Corn roots are relatively surface feeders. Therefore, only shallow cultivation should be practiced. For horse tools the twelve-point cultivator is recommended. The fine teeth are made in such a way that if properly handled they need not dig deeply into the soil. For hand tools, the many wheel hoes are useful. Coupled with these tools, of course, the hand hoe is recommended, especially for work close to the plant. During the summer it would be advisable to remove the sucker growths that come out from around the base of the stalk, as they have a tendency to decrease the productiveness of the plant. Corn is not able to withstand drouth as well as many other crops. Therefore, conservation of moisture by maintaining a dust mulch is essential.

PESTS

Diseases. The same smut that attacks field corn is found growing on sweet corn. To combat the disease, the following is recommended: soil free from the disease, which means rotation of crops; eradication of portions of the plant found diseased; and care not to apply manure containing smutted fodder.

Insects. The corn ear worm or bollworm is injurious to sweet corn in several sections of New York State. There is no satisfactory remedy.

HARVESTING

In harvesting the corn, the ears should be removed from the stalk with care. Do not break the stalk in severing the ears. Do not press so tightly against the ear that the kernels will be de-

stroyed. When the silk at the end of the corn has become dried and brown in color, the corn, as a rule, is ready for harvesting. However, this is not always a reliable indication of maturity on the part of the kernel. If the ear appears plump and mature, it is ready to harvest. If one is not experienced in this regard, it may be best to open the husk slightly and view the kernels. They should be in the milk stage, large, dull white, (not glossy), and soft. Then one is practically sure of the condition of the corn.

MARKETING

For canning, the ears may be gathered in baskets or boxes as picked, dumped into a wagon and, when a load is ready, carried immediately to the cannery. The grower is credited the weight of the corn, kernels, husks, and cob.

The market gardener would take his corn to the packing shed, and should there carefully grade the corn and pack each grade in a separate receptacle. A bushel box should hold from forty-five to eighty ears, according to the size. Some growers pack the ears for shipment in bags, one hundred in each bag. This is not a good practice, because the corn is easily bruised, becomes heated, and is not in an attractive condition. Boxes or baskets should be used, and the corn should be packed to attract the eye.

The home gardener can go out in the garden thirty minutes or less before dinner and harvest the corn direct from the plant, placing it immediately in the water for cooking, and enjoy it a little later with the guarantee that it is as fresh as one can get it.

After the corn has been removed from the entire plot, or frost has destroyed it, the stalks should be severed from the roots and the garden made as attractive as possible.

YIELDS

One can obtain from eight thousand to nine thousand ears per acre or from two and one-half to five tons of corn ears. A small patch of corn will give the home gardener ample returns.

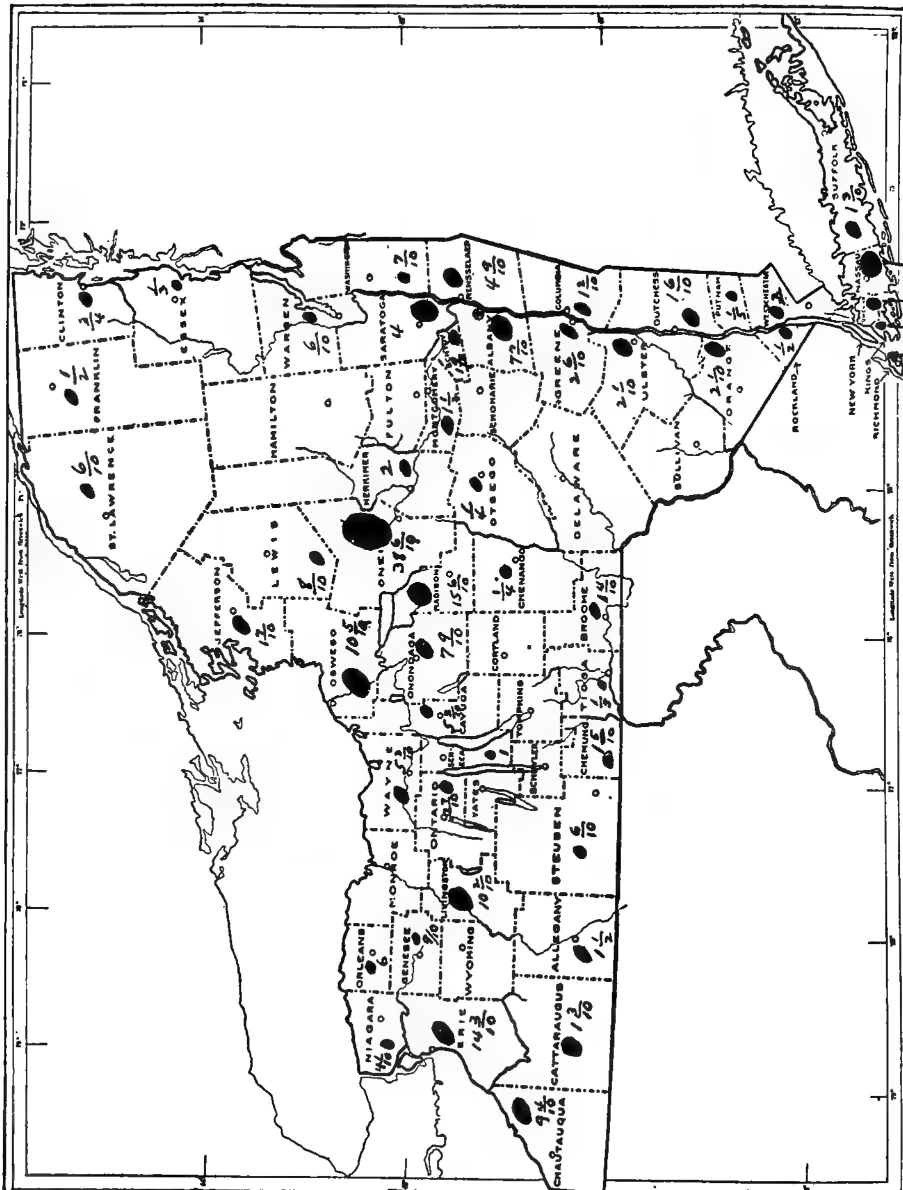

FIG. 470.— MAP SHOWING SWEET CORN ACREAGE. FIGURES IN COUNTIES REPRESENT ACRES BY HUNDREDS

ACREAGE AND VALUE OF SWEET CORN GROWN IN NEW YORK STATE, BY COUNTIES

(Taken from U. S. Census 1910)

County	*Acres*	*Value*	*County*	*Acres*	*Value*
Albany	772	$35,661	Oneida	3,857	$118,058
Allegany	152	3,236	Onondaga	791	31,089
Bronx	....	....	Ontario	275	5,568
Broome	141	7,056	Orange	215	10,381
Cattaraugus	135	5,485	Orleans	596	14,802
Cayuga	533	14,932	Oswego	1,047	22,239
Chautauqua	938	27,399	Otsego	27	1,864
Chemung	134	8,832	Putnam	19	1,005
Chenango	26	799	Queens	1,179	64,060
Clinton	65	2,566	Rensselaer	493	15,222
Columbia	118	4,027	Richmond	106	4,641
Cortland	....	....	Rockland	49	2,979
Delaware	10	653	St. Lawrence	62	1,998
Dutchess	163	6,849	Saratoga	400	14,972
Erie	1,430	58,065	Schenectady	188	9,128
Essex	34	1,575	Schoharie	3	213
Franklin	44	1,942	Schuyler	7	220
Fulton	39	2,348	Seneca	95	2,004
Genesee	82	1,768	Steuben	61	2,037
Greene	260	3,281	Suffolk	130	6,867
Hamilton	1	20	Sullivan	17	455
Herkimer	202	6,993	Tioga	20	1,104
Jefferson	170	6,264	Tompkins	12	2,100
Kings	167	18,291	Ulster	206	10,549
Lewis	83	1,323	Warren	62	2,819
Livingston	1,017	26,973	Washington	66	3,198
Madison	1,557	30,715	Wayne	535	11,189
Monroe	1,023	47,327	Westchester	205	24,169
Montgomery	150	9,258	Wyoming	7	333
Nassau	3,128	203,082	Yates	15	633
New York	9	1,360			
Niagara	411	18,020	The State	23,739	$942,023

POP CORN

J. G. Curtis, Rochester, N. Y.

Farmers' Institute Lecturer

The growing of pop corn is attracting more attention than formerly as it has proved to be a very satisfactory money crop where the conditions are favorable.

The pop corns are a special group of flint corns used for "popping" as the name suggests, for eating out of hand or in confections. They are characterized by the small size of the kernels and their excessive hardness, and by the large proportion of horny substance contained in the kernels, which consists of a large percentage of moisture and gives the kernels the property of popping, or turning almost completely inside, out on the application of heat.

The stalks of pop corn are considerably smaller than those of field corn, but on good soil will average about eight feet in height.

The actual popping of the kernels is due to the expansion of moisture in the starch cells, the application of heat converting the moisture into steam, making the cell walls give way and causing an explosion with sufficient force to change the kernel into a large, irregular, flaky mass that has an especial value as an edible product.

While in popping it loses in weight about 10 per cent., due to the evaporation of moisture by the heat employed, it should increase in bulk in the ratio of about sixteen to one. There are several factors which control this result, such as the even application of the heat and the condition of the corn. It may be too damp or too dry for best results, and, since the moisture content is high when the corn is harvested, it is usually held over one season before marketing.

DISTRIBUTION

Pop corn is grown successfully throughout the northern half of the United States wherever other corn can be grown, and at one time was grown in nearly every garden in New York and the New England states, but it has gradually come to be a sort of special farm crop grown in a commercial way by men who have found it profitable and have made the growing, handling and marketing of it a special study. The great bulk of the crop is now grown in Iowa, Michigan, Illinois, Wisconsin and Nebraska.

VARIETIES

There are about twenty-five different varieties of pop corn, but these are simply variations of the two distinct types or classes known as rice corn and pearl corn. The rice corn has kernels more or less pointed, and sometimes called "squirrel tooth." The pearl corn has kernels rounded or flattened over the top and are very smooth. These two classes may be divided into early, medium and late, and these again into white, yellow, and colored (not yellow). All of these varieties cross with each other so readily that it is difficult, under ordinary methods, to keep a variety strictly to any given type. The different varieties of both the rice and pearl corn may vary as to color through the several shades of white, amber, yellow, red, and black; also red and white striped. Some of the best known white varieties are the Monarch Rice, Snowball and Egyptian. Of the white pearl varieties, the Common White Pearl, Mapledale, Prolific and Nonpareil are standard varieties. Of the yellow pearl varieties, the most valuable are Queens Golden and Dwarf Golden, each of which has a yellowish color when popped and has the taste peculiar to yellow corn. In some localities the black varieties are quite popular and said to be very prolific.

SOIL AND FERTILIZERS

Any well drained fertile soil, except a low peaty or muck soil, is suitable for the growth of pop corn.

Whether the soil is sand, gravel, loam or clay, it must have a sufficient quantity of available plant food elements to give best results. In furnishing any or all of these, one should remember

that they are not needed to grow any specific crop, but rather to overcome deficiencies of available plant food in that particular type of soil. All of these types of soil are usually lacking in available nitrogen unless well supplied with humus, and it should be supplied in large applications of organic matter, either in stable manure or by the use of cover crops; and even then there is apt to be a deficiency of available nitrogen early in the season, which should be supplied by a broadcast top-dressing of nitrate of soda at the rate of one hundred to two hundred pounds per acre. The application is made when the corn is two or three inches high. For best results the mineral elements, phosphorus and potassium, should also be applied at the rate of four hundred pounds of acid phosphate (14 per cent. available) and one hundred pounds of potash (50 per cent. actual) per acre; these to be mixed together and drilled into the soil broadcast with the fertilizer drill three or four inches deep, before planting.

SEED

The careful selection of seed corn from the field is one of the important factors of success in growing pop corn, and it is a good practice to grow the seed for the next year's planting in a plot by itself, where the tassels may be removed from all poorly developed and barren stalks before they have shed their pollen. In this way we can do much toward breeding up our seed corn to the special type best suited to our needs, in the same way that we breed our animals for special purposes.

PLACE IN ROTATION

When grown in a regular rotation of crops, pop corn usually takes the place of ordinary field corn and for much the same reasons. Sometimes it is grown in place of one of the "money" crops, such as potatoes. This is often the case when the soil is too heavy for potatoes. The rotation then has to be arranged so that the pop corn and field corn are not grown in adjoining fields, as the pollen is carried by the wind and they become mixed very easily, which affects the quality and appearance of the pop corn.

PLANTING

The seed should be planted about May 25 to June 5, in the latitude of Central New York, or as soon as the ground has warmed up so that the seed will germinate and not rot. The planting should be done with a corn planter or an ordinary grain drill, making the rows three and one-half feet apart and dropping the kernels about eight inches apart in the row.

SUBSEQUENT CARE

The field should be rolled at once after planting, and it should be gone over crosswise of the rows with a slant-tooth harrow or weeder every five or six days until the corn is six or eight inches high. This will tear out a little of the corn, but more has been sown than was needed so as to allow for this. It is a large number of well developed ears rather than stalks that we are trying to obtain. The balance of the season the cultivation should be the same as for ordinary field corn. Pop corn ripens in one hundred to one hundred and thirty-five days from planting, according to the variety, weather conditions and other factors. The maturity can be hastened to some extent by a liberal application of the phosphatic fertilizer. On the other hand, it is retarded by the use of large quantities of stable manure, which gives an excess of nitrogen late in the season. It is especially important that pop corn should ripen before frost comes, since, if injured for popping, it has little value for anything else.

HARVESTING AND STORING

Pop corn is harvested the same as other field corn and is usually husked by hand. The price paid for husking by the bushel is usually 50 per cent. higher than for field corn, as the ears are much smaller. When it is to be stored the cribs are usually lined inside with ¼-inch mesh woven wire netting to protect the corn from rats, mice, squirrels and other vermin. The great difficulty in keeping pop corn from one season to another without having it destroyed by rats or mice, is the chief reason why the business has gradually come into the hands of a comparatively small number of growers who are especially equipped for handling it successfully.

YIELD

A bushel of ears of pop corn when husked weighs 38 pounds, but when cured one season the standard weight is 35 pounds. There are 7 pounds of cobs in each bushel of ears, so that 2 bushels of ears (70 pounds) make 1 bushel of shelled corn (56 pounds) after shelling and removing 14 pounds of cobs. Sixty bushels of ears per acre is considered a good yield, although some growers have bred up their seed until, with liberal feeding and careful cultivation, they obtain between 80 and 90 bushels per acre.

MARKETING

Pop corn is marketed in many different ways. The western grower usually raises it on contract at so much per pound shelled, or sells the entire crop to one of the large dealers in the West who supplies the wants of the trade throughout the country. The shelled corn is sometimes packed in one-pound boxes for the retail grocery trade, but for best results in popping it should be left on the cob until ready to use. It seems there is always enough moisture in the cob to keep the chit end of the kernel from becoming too dry and hard.

The eastern growers usually sell it to the grocer in nearby towns at about one dollar per bushel of ears, and the grocer retails it in small lots at five to eight cents per pound. Some of the larger growers ship their entire crop in barrels to wholesale grocers in the large cities where it is sold on account.

MUSHROOMS

P. K. Nott, Troy, N. Y.

INTRODUCTION

Since this article is intended for general circulation, technical details are purposely omitted, and an effort has been made to treat the subject in a manner to assist the amateur rather than the professional grower, for the commercial growing of mushrooms has been developed into a highly specialized industry. The novice who wishes to take it up as a business would do well to first serve an apprenticeship with some commercial grower and learn it literally from the "ground up."

Many read alluring advertisements of "money in mushrooms" and, with visions of easy wealth, are tempted to invest in a liberal supply of spawn, only to realize their own inefficiency and awaken to the fact that too often, alas, the interest of the advertiser ends with the sale of his goods.

Mushrooms can hardly be considered one of the necessities of life but rather a luxury, for in actual worth as fuel for the human machine, one pound of good round steak is equivalent to nine pounds of mushrooms. It is not to be disputed, however, but that they constitute a decidedly welcome addition to the bill of fare, whether served alone or in combination with various meat dishes, and a person who has acquired a liking for them will derive a pecuniary as well as gastronomic satisfaction in being able to produce his own supply.

LOCATION

The first requisite for the successful growing of mushrooms is a proper place where atmospheric conditions — temperature and moisture — can be controlled. It is imperative that a uniform

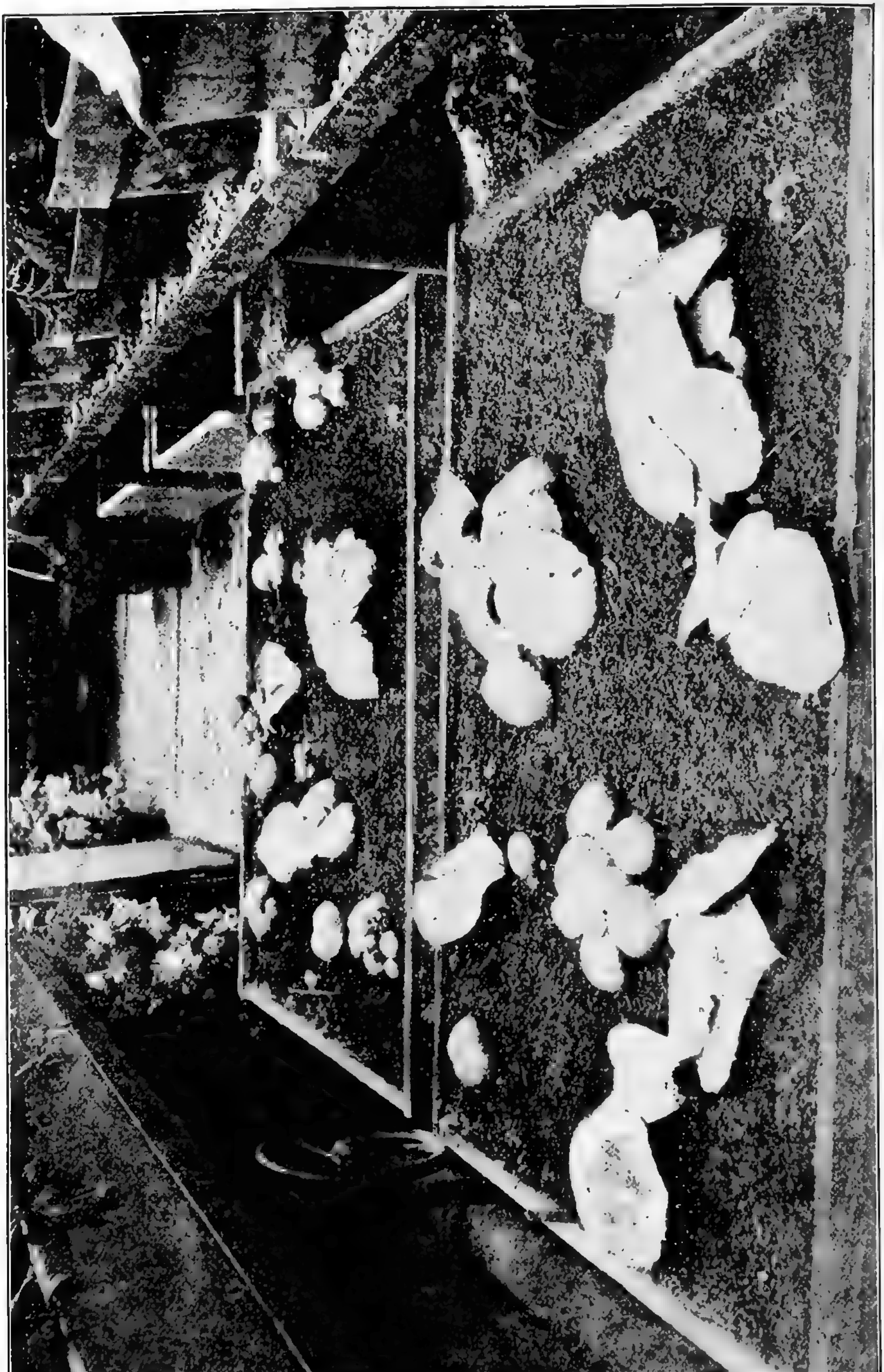

FIG. 471.—MUSHROOMS GROWN IN BOXES UNDER BENCH IN GREENHOUSE

temperature of from 55 to 60 degrees F. be maintained constantly. At the same time both beds and air must be kept moderately moist, with ventilation so under control as to avoid stagnation of air, which is apt to result in disease and decay.

These conditions may be secured in a cellar, cave, shed, barn, or under greenhouse benches. The matter of light and darkness must be controlled also, since the best crops are produced in the dark; but this can be secured through the use of screening material.

COMPOST

The next item is the compost and its preparation for the beds. The requirements are simple, but the process must be carried out with the greatest care or failure is bound to result. Fresh, strawy stable manure must be procured. Leave in the straw but throw out any coarse weeds or stems. Sprinkle this until it is well dampened, turning and forking it over while wetting until the entire pile has a uniform degree of moisture. A safe moisture test is that of compression. The mass should have just what water it will hold without squeezing out under moderate pressure.

After dampening, pile up, pressing down with a fork while piling. The finished pile should be about three feet thick or high. Within a short time this begins to decompose and in so doing generates heat which hastens the process of decomposition. This should not, however, be allowed to develope too far or the heat will become so great as to burn, and ruin the compost. For this reason, therefore, the pile should be pulled apart at the end of four or five days, moistened slightly during the operation, forked over and re-piled.

In about eight days more repeat the operation and at the end of another eight days the compost should be ready for use. This can be determined on opening the pile by noting the change in the color of the straw from yellow to brown. It should also be softened enough to break easily, and the odor will have changed, the rank " manure " smell being changed to a sweeter one.

PREPARING THE BEDS

It is assumed that the mushrooms are to be grown indoors in beds, and for these the compost is now ready. The beds, if ele-

vated from the floor, should be constructed three feet wide and ten or twelve inches deep, and should be put in place while the process of compost making is going on, so that there will be no delay when the time comes for filling. Rough boards will answer as it is not necessary that the boxes be tight.

Spread the compost evenly in the beds, pressing down firmly as each successive layer is added; continue until the filled bed has a uniform depth of about eight inches. Place a thermometer in the center of each bed, plunging the bulb a couple of inches below the surface.

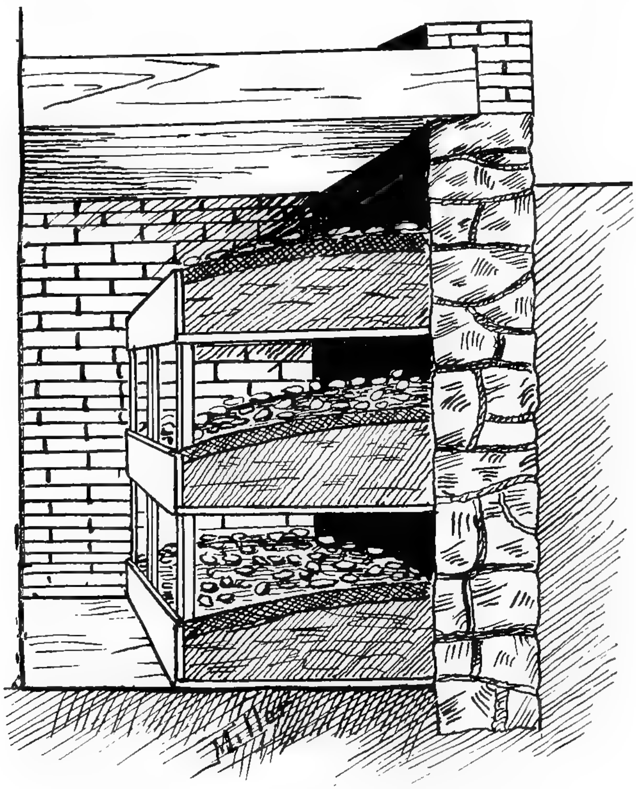

Fig. 472.—Shelf Beds in Warm Cellar

In a short time the second stage of decomposition will set in, causing a rise in temperature. In from five to eight days, however, this should be over, and when the heat has fallen to from

70 to 75 degrees, the beds are ready for planting with the prepared spawn. This process is known as "spawning."

The spawn (described later in this article) commonly comes in dried cakes, called bricks. Break these bricks into pieces from one and one-half to two inches square, and place on edge in the compost, spacing them about twelve inches apart each way, and covering them to a depth of two inches.

Give the beds a light sprinkling, sufficient to maintain a proper degree of moisture, which experts set at 40 per cent., but which may for all practical purposes be determined by the "squeezing" test.

CARE WHILE GROWING

In about ten days the spawn should be running, which will be indicated by fine white threads spreading outward from each piece. In case any plantings have failed to start, remove them and insert fresh ones. The beds should then be covered evenly, about one-inch thick, with fine, moist garden loam, pressed down firmly. This should be watered lightly from time to time as needed to maintain a damp surface. Use lukewarm water and apply with a fine spray, preferably from a watering pot. If the beds are conveniently located, moisture may also be controlled by spraying the walls and floors. Burlaps hung along the fronts of the beds may likewise be sprayed, and this will assist in keeping both air and beds moist.

BEARING SEASON

Bearing should begin within from six to eight weeks from the time of spawning and continue for two or three months. Estimates of yields vary from one-half pound to two pounds per square foot of area and market values run from twenty to sixty cents a pound wholesale and twice that at retail.

The picking should be done as fast as the mushrooms attain the proper size, usually every other day; although daily gatherings are sometimes necessary. They are the best size for picking when the "veil" or tissue on the under side of the cap has begun to break.

The method of picking recommended by experts is to take hold of the cap and remove by twisting, which brings the stem away

with the cap. If the product is to be sold most of the stem should be cut off and the cap brushed lightly to remove any traces of soil. For marketing, mushrooms are usually packed in baskets, the size holding four pounds being the most popular. These should be lined with paraffined paper, preferably blue in color, which makes an attractive package and one in which the mushrooms keep well.

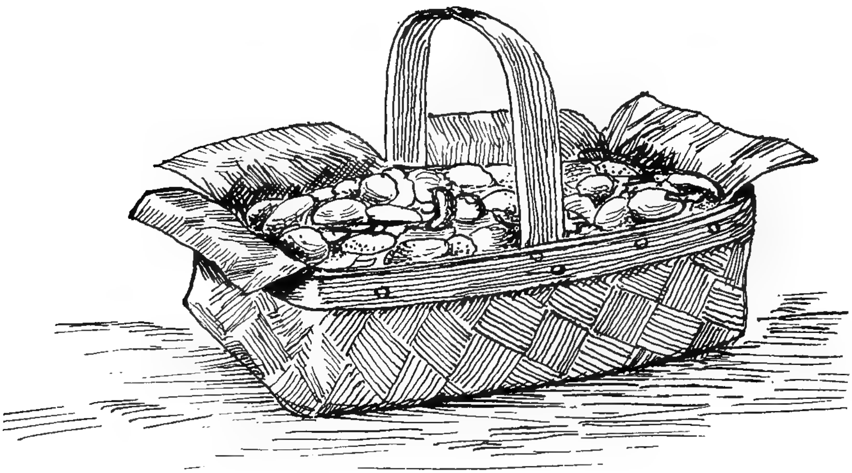

FIG. 473.—MUSHROOMS ATTRACTIVELY PACKED FOR MARKET

When a bed becomes exhausted its use for mushroom growing is over, although it makes an excellent garden fertilizer. It must be cleaned out thoroughly, all woodwork whitewashed, and the building or room fumigated, after which preparation may be made at any time for a new crop, starting with fresh material as in the beginning.

INSECTS AND DISEASES

The mushroom has some insect enemies, chief of which are sow bugs or wood lice. These may be controlled by poisoning. Dip pieces of potato into a strong solution of arsenic or paris green and put them in small yellow boxes or tins with some dry rubbish. These boxes placed on the beds will attract, kill and collect the bugs in one operation.

Snails sometimes cause trouble but these are easily caught by using lettuce or cabbage leaves.

A small insect called "springtail" appears at times where mushrooms are grown in caves, but this condition is due mainly to carelessness in cleaning out. The larvae of a species of small fly is also injurious on occasions but both of these latter may easily be destroyed by fumigating with carbon bisulphide.

Mushrooms are subject to some diseases, but as these are chiefly the result of improper conditions and lack of care they may be avoided by securing the right conditions and exercising care in handling the growing crop.

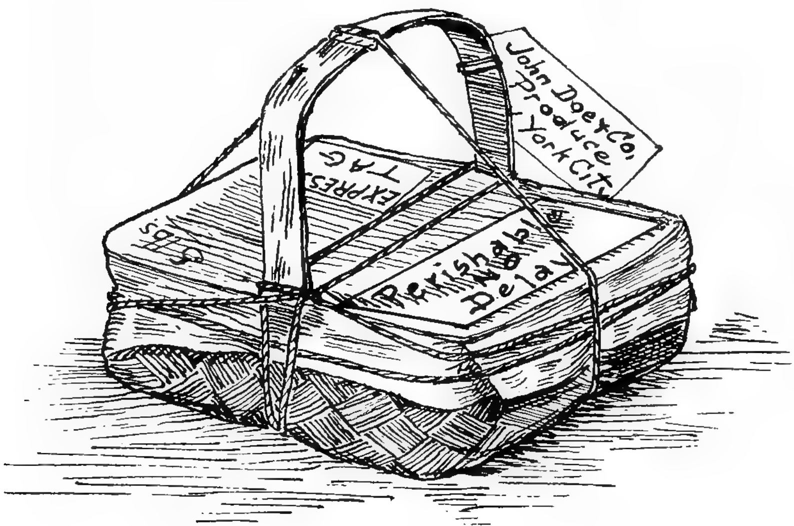

Fig. 474.— Package Ready for Shipment

MUSHROOMS AS CATCH CROP

In addition to the bed method, mushrooms are often grown in cool greenhouses such as are used for carnations and vegetables. In such cases the pieces of spawn are buried directly in the rows, between the plants, and are given no special care, being put in simply as a catch crop. The expense of planting is not great and the results are often surprisingly good.

They have also been grown in the same way in kitchen gardens among coarse-leaved plants such as beans, which furnish a maximum amount of shade.

A measure of success too has been attained from plantings made in lawns and pastures during the summer time, the crop

appearing in the fall. Only well-drained spots should be selected and the spawn inserted just below the turf.

These methods are, of course, haphazard, but if the season should be favorable the results are well worth the slight expenditure for spawn.

ABOUT SPAWN

The three leading types of spawn on the market are: French or flake, English and American. The latter two are in brick

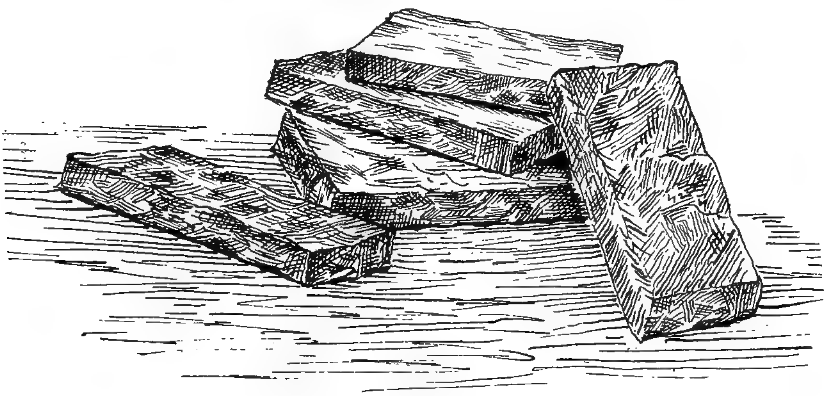

FIG. 475.— BRICK SPAWN

form. Of the three varieties, the French is probably the least desirable as it dries out more quickly than the others, and fresh spawn is always the most desirable. The American is probably the best and is used more extensively than any other. It is scientifically prepared and moreover the purchaser has the opportunity of selection of type according to style, size, hardiness, yield and color.

All of the leading seed houses carry the different kinds in stock, both American and foreign, and can fill orders on short notice.

SUMMARY

In conclusion it will be well to emphasize the important points in mushroom culture, namely: proper preparation of manure and beds; careful attention to moisture supply; fresh spawn, and above all, care — constant watchful care — from start to finish, omitting no details, but giving attention to them at the proper time and not twenty-four hours afterward when the damage may be done and the prospects of a crop ruined.

HORSE RADISH

Edward van Alstyne, Kinderhook, N. Y.

Director of Farmers' Institutes

CONCERNING THE CROP

Horse radish is now extensively used as a condiment by hotels and restaurants during the entire year. The demand is increasing and the price is high, for it is not generally grown as a crop. There are several reasons for this, such as lack of the right kind of soil, the difficulty that when once established it is hard to eradicate, and the fact that formerly there was no established trade for it, it having only been known in a wild state. Were people to grow it generally, doubtless the supply would soon be greater than the demand. Because it can be grown so inexpensively, with a ready sale and good prices, it is to be recommended as a profitable crop where one has the right kind of land near a good market.

For those who like it for home use a couple of dozen plants set in some convenient corner will supply the needs of an ordinarly family. The only attention needed is to keep out weeds and see that new plants are set to replace those taken out.

SOIL

In its native state horse radish is found growing in small plots in swampy places or along streams. Where one has such soil it may be utilized for growing these roots with practically no expense for culture, although when grown under these conditions they will not be so large or smooth as when grown on good soil with abundant cultivation.

Horse radish thrives best on a deep rich soil abundantly supplied with humus. There, with good cultivation such as should be given corn or potatoes, the roots will be large and a goodly amount will be obtained from an acre.

PLANTING

The amount of seed produced is generally small, and much more time and attention is required to start it from seed than from

cuttings, as is usually done. These are small roots from four to six inches long and from one-fourth to a half an inch in diameter, discarded when preparing the large roots for market. Such can be purchased from seedsmen for about twenty-five cents a dozen — in large quantities for much less. The tops may be cut off and reset, but thus set they require a longer time to mature than from the cuttings or side roots, and their use is recommended only for the home plat where land is abundant. The cuttings may be bunched in the fall and held in a cellar over winter for spring planting.

For a market crop on tillable land the rows should be three feet apart, with the plants from a foot to eighteen inches in the row. These should be set deep in a furrow, or by using a small bar or dibble to make the hole. Such planting is usually — and is better — done in the spring; but it may be done at any convenient time. If desired, beets, cabbage or some such early vegetable may be grown between the rows the first season. This practice is not to be recommended except where land is scarce or very high in price, as much more hand hoeing is required and the growth of the radish is apt to be checked. When grown by itself a horse cultivator can be used and no other care is needed other than to keep out the weeds.

HARVESTING

The roots should be large enough to dig the second season. They may be dug in the fall or left in the ground all winter as are parsnips. It is usually wise to have a portion of the crop dug in the fall to supply the winter trade, and that required in early spring while frost is in the ground or it is too wet and muddy. The roots may be grated, treated with salt and vinegar, and bottled for future use.

The price received in the market for horse radish ranges from eight to ten cents per pound.

THE IMPORTANCE OF VEGETABLES IN THE DIETARY

IDA S. HARRINGTON

Bureau of Farmers' Institutes, Department of Agriculture, Albany, N. Y.

"Come, ye thankful people, come,
Raise the song of Harvest-Home:
All is safely gathered in,
Ere the winter storms begin;
God, our Maker, doth provide
For our wants to be supplied;
Come to God's own temple, come,
Raise the song of Harvest-Home."
— HENRY ALFORD.

In words like these we give thanks at harvest time for the products of the good brown earth, of summer sun and rain. Too often we fail in the thanks that consist in "safely gathering in" and *using* the bounty of orchard, garden and field. We are told that over one-half of this is wasted by us every year, while over one-half of the world goes hungry.

Our canning club specialist at Washington, Mr. O. H. Benson, is right in saying that the diet of American people consists too largely of meat, coffee, bread, butter, eggs, and patent medicines. Improper feeding is responsible for over 80 per cent. of human ailments. This is not so much a question of over-or under-feeding as of wrong feeding. Good feeding consists of two things: the right food, and the ability of the body to use it. We may starve in the midst of plenty if our digestion is poor. Inefficient powers of digestion may be due to a poor inheritance, to lack of fresh air, or to a lack of sufficient water; but the chief cause is found in a poorly balanced dietary. Poor feeding in childhood is sure to result in poor adult health.

The body's needs have not been met when we have supplied protein foods for the building and repairing of tissue, and starches, sugars, and fats to furnish energy. Such foods as meats, cereals,

legumes and eggs, all tend to form acids, and must of necessity be neutralized by a free use of fruits, milk and vegetables. Unless a balance is maintained by these means, and by a liberal allowance of water, there cannot be good digestion. Poor digestion is wasteful of food, of money, and of strength. We further need to use vegetables freely in order to furnish mineral matter to the body. Why buy iron in a bottle when it is to be had in spinach and beans? Or lime, when cabbage and celery furnish it? Why purchase digestive tablets when succulent vegetables stimulate digestion?

In her "Rules for Planning the Family Dietary" Professor Flora Rose tells us that: "A liberal use of vegetables in the diet is necessary because they cleanse and regulate the body, stimulate the intestines, neutralize acids, and purify the blood, correct anaemia and improve the general health by increasing the amount of iron furnished to the blood." She suggests that vegetables, together with fruits, cereals, bread, potatoes and milk, should form the bulk of our food; and that we should largely decrease the amount of meat, candy, preserves, rich sauces, desserts, cakes, etc., to which we have been in the habit of giving so prominent a place.

SOUPS

Vegetables may figure in every course of the meal, from soup to dessert. Cream of vegetable soups are relished by many who have no liking whatever for milk by itself, and such a soup combined with bread and butter, and fruit, furnishes a "balanced meal," simple as it is. Cream soups are made by combining equal parts of vegetable pulp (obtained by draining and forcing through a colander any well-cooked, well-seasoned vegetable) and cream gravy made as follows: Melt one level tablespoon of butter or fat in a saucepan; add one level tablespoon flour and stir till smooth. Remove from the fire. Add gradually one cup of cold milk. Return to the fire and stir constantly for five minutes. After combining the vegetable pulp and cream gravy, thin with hot milk to suit individual taste, and add more seasoning if necessary. Careful seasoning, and variety in seasoning, are essential if we would keep a dish popular with our families. Such season-

ings as celery salt, onion salt, paprika, etc., save cream soup from tasting "flat." A little left-over bacon, chopped fine, is especially nice for seasoning cream-of-corn soup.

Rice and Celery Soup

(From "The Housewife" for March, 1915)

Boil 1 cup rice and 2 heads celery in 2 quarts of water till soft. Rub through a strainer, add 1 cup of milk and 1 cup of cream and seasoning.

Carrot Soup

(From "The Housewife" for March, 1915)

Put through a meat-chopper 1 pint of carrots and a green sweet pepper, simmer in 3 pints of water till soft. Rub through a sieve, and add a pint of milk (combined with 1 tablespoon butter and 1 tablespoon flour) and season with salt, pepper and a little nutmeg or powdered mace.

COOKING WINTER VEGETABLES

In spite of the convenience of canned vegetables, there is a value in such vegetables as cabbage and turnips which we must not overlook. To render these vegetables mild and digestible we must cook them quickly in plenty of water with the cover off; change the water two or three times during cooking; and drain off the water when the vegetables are nearly done, substituting a little milk for the final cooking. Avoid overcooking, as this makes cabbage tough and develops the dark color, and the strong flavor and after-taste.

Baked Cabbage

(From the Presbyterian Cook Book, Boonville, N. Y.)

Cut the cabbage in small pieces, boil until tender in salted water. When cold, chop fine, add 2 beaten eggs, 1 tablespoon butter, 2 tablespoons cream. Mix well, put into a buttered pan and brown in the oven.

Boiled Red Cabbage

Red cabbage should be boiled in an uncovered saucepan, but in a small amount of water and without stirring (merely shaking the saucepan occasionally to keep the cabbage from sticking), in order that the attractive color may not be lost. Shred the cabbage, boil

as directed for half an hour; then season with salt, add one level tablespoon butter and one tablespoon pork drippings, duck fat or goose fat, and one apple cut in small pieces. Thicken slightly by dredging with a little flour. Cook until the apple is tender enough to be thoroughly mixed with the cabbage.

Fried Onions and Apples

(From the Presbyterian Cook Book, Boonville, N. Y.)

Cut thin slices of salt pork and fry in saucepan. Fill dish with sliced onions and apples, add a little water and cook until brown, stirring often. Add a little pepper.

COOKING SUMMER VEGETABLES

Young, mild-juiced vegetables like green peas, beans, etc., should be cooked slowly in a covered saucepan, with a small amount of water, in order to develop their full flavor. When tender, drain, season with butter, salt and a little sugar. A little milk or cream may be added before serving.

LEFT-OVER VEGETABLES

There are as many possibilities in vegetable left-overs as in those of meat, potatoes or bread. Vegetable hash is highly esteemed in New England, and may be looked for on the day after a boiled dinner. Baked vegetable hash is made by melting one tablespoon of butter in a frying pan, adding 1 pint of mixed chopped vegetables (or any one vegetable alone), 1 pint of chopped potatoes and 1½ cups soup stock. Mix until heated, season well, set in the oven and bake thirty minutes.

Green Pea Croquettes

Take equal parts of left-over green peas and thick cream gravy (made of 4 level tablespoons butter and 4 level tablespoons flour to 1 cup of milk). Season well and cool. Shape into croquettes, roll in bread-crumbs, in beaten egg (adding 1 tablespoon of cold water to each egg) and again in bread crumbs, and fry in deep fat.

Vegetable Salads

Any left-over vegetables such as green peas, beans, asparagus, carrots or beets may be served separately or in combination as a

salad. They should be stirred as little as possible, and should be served the day they are prepared. Have them well drained and cold before adding the salad dressing. In general, a French dressing is best adapted to vegetable salads.

Mrs. Lincoln's French Dressing

One saltspoonful salt, ½ saltspoonful pepper, 3 tablespoonsful oil, ¼ teaspoonful onion juice, 1 tablespoonful vinegar or lemon juice. Mix in the order given, adding the oil slowly. The onion may be omitted and a teaspoonful of made mustard may be added. if desired.

Canned-Tomato Salad

Fresh sliced tomatoes make one of our favorite salads, but a good substitute may be obtained during the winter months when we long for something that will add a little "snap" to our meals. To make the canned-tomato salad, heat 1 pint of strained tomato, seasoned with 1 teaspoon salt, a little pepper and 1 teaspoon onion juice. Soak ¼ package of granulated gelatine in a little cold water, and add just enough boiling water to dissolve. Add to the tomato, boil for one minute, strain into small moulds and chill. Serve with salad dressing.

Salad Dressing

(From the Presbyterian Cook Book, Boonville, N. Y.)

Melt 2 tablespoons butter and stir in 2 tablespoons flour in which 1 teaspoon mustard and 2 teaspoons salt have been mixed. Then add 1 cup milk. Cook 2 minutes, then add ½ cup vinegar, 3 well-beaten eggs and 2 tablespoons sugar. Cook until thick. A cup of whipped cream may be added when cold.

VEGETABLE RELISHES

It is not fruits alone that form the basis of jams, marmalades, etc. Carrot may be added to orange marmalade without injury to the flavor, and with considerable lowering of the cost. Tomato relish may be prepared by boiling 2 pounds of ripe tomatoes (scalded and peeled) with ½ cup of vinegar, 1 pound sugar, and a teaspoon of grated ginger root, until thick.

VEGETABLE DESSERTS

Squash, pumpkin, carrot, and sweet-potato pie have as large a following as have apple or mince.

Pumpkin Pie

The only tedious part in the making of a pumpkin pie lies in preparing the pumpkin. There is a " short cut " to this which is not generally known. Bake the pumpkin whole (just as though it was an overgrown apple) until it is tender throughout. By this method it takes but a few moments to separate and mash the pulp. To one cup of this add 1 cup of milk, 1 egg, ½ teaspoon of cinnamon, ½ teaspoon ginger and a little salt. Make a paste by chopping ½ cup shortening into 1½ cups of sifted pastry flour and adding ½ teaspoon salt, and just enough cold water so that the paste can be rolled. Line a deep pie tin with this, fill with pumpkin mixture, and bake till a golden brown.

VEGETABLE SWEETMEATS

Although it is too troublesome a process for the average cook, expert candy makers succeed in producing crystallized carrots,— or glaced carrots as they are called — that compare favorably with crystallized fruits and nuts. This bears out the theory that vegetables may have a place in every course, from soup to dessert, and be excellent in all.

LEGAL WEIGHTS AND MEASURES OF VEGETABLES SOLD IN NEW YORK STATE

JOHN H. FARRELL, ALBANY, N. Y.

State Superintendent of Weights and Measures

Vegetables, like all commodities sold in this state, must be sold either by weight, measure or numerical count.

There are two simple ways in which vegetables may be sold in the state of New York: (1) by the head or bunch, and (2) by weight.

The method of sale by dry measure is far more complex, for, in the first place, when commodities are commonly sold by heap measure the law provides:

> "The measure of capacity for all commodities commonly sold by heap measure shall be the half bushel and its multiples and subdivisions. The measures used to measure such commodities shall be cylindrical, with plain and even bottom, and of the diameter of nineteen and one-half inches from outside to outside if a bushel; fifteen and one-half inches if a half bushel, and twelve and one-third inches if a peck.
>
> "All commodities sold by heap measure shall be duly heaped up in the form of a cone, the outside of the measure to be the limit of the base of the cone, and the cone to be as high as the commodities will admit."

Furthermore, bushels of various vegetables must consist of a definite number of pounds, in the absence of any agreement to the contrary: peas, potatoes or beans, 60 pounds; onions, 57 pounds, sweet potatoes, 54 pounds and carrots, 50 pounds. For a fractional part of a bushel, like fractional parts of the above weights are required. There are similar provisions as to various fruits and grains.

When more than six heads or bunches of vegetables are sold by count, or whenever vegetables are sold by weight or dry measure, the weight, measure or count must be marked on a label

or a tag attached to the vegetables; or, if in a container, on the side or top of the container or on a label or tag attached thereto. Where they are not in a container a sales slip may be given under the following conditions:

> "In case of sales of commodities not in containers, when circumstances make it impracticable to place the marking on or attach it to the commodity, a sales slip showing the name of the seller, identifying the commodity sold and showing the required weight, measure or numerical count may be delivered to the purchaser at the time of the sale or delivery, and in such case no other marking will be required. Such sales slip must give in writing the requisite information with equal clearness and distinctness as if marked on or attached to the commodity. The provisions of any regulation requiring the marking to be on or attached to the commodity will not be complied with by the use of a sales slip."

When the sale is made in container, the quantity need not be marked, provided the container is of one of the following sizes: barrel, half-barrel, bushel, or multiples of the barrel, or sub-multiples of the bushel divisible by two.

This is better understood by referring to the regulations adopted by the Superintendent of Weights and Measures pursuant to law:

> "*Containers for vegetables, produce and fruit of standard size.*
>
> "(a) A barrel shall represent a quantity of 7,056 cubic inches or be of the following dimensions: Head diameter, seventeen and one-eighth inches; length of stave, twenty-eight and one-half inches; bilge, not less than sixty-four inches outside; distance between the heads, not less than twenty-six inches.
>
> "(b) A half-barrel shall represent a quantity equal to 3,528 cubic inches. Not being a multiple of the quart, the half-barrel cannot be used as a container for fruit.
>
> "(c) Such containers other than barrels or half-barrels need not be marked if of the following sizes: Two bushels, one bushel, half-bushel, one peck, half-peck, quarter-peck, one quart, one pint and one-half pint.

"(d) In measuring a barrel used or to be used as a container for vegetables, produce or fruit, the capacity thereof shall be ascertained by taking the measurement thereof between heads, or, if the barrel is so made that no top can be inserted therein, then by taking the measurement stricken full. If, when so measured, the contents equal 7,056 cubic inches, no marking need be placed on the barrel; otherwise, it must be marked as provided in section 16-a. Half-barrels shall be similarly measured.

"In measuring containers used or to be used for vegetables, produce or fruit, other than the barrel or half-barrel, the capacity thereof shall be ascertained by taking the measurement thereof to the top of the sides, or if a cover is to placed thereon, which shall come below the top of the sides, then to the lowest point of the cover. In determining such capacity, the standards of measure are the half-bushel, containing 1,075.20 cubic inches, and multiples and sub-divisions thereof of proportionate cubical contents.

"(e) A variation in contents of one and one-half per cent. (1½%) will be allowed, but the variation shall not be uniformly below in a test of twelve containers taken at random."

"Containers for vegetables, produce and fruit of other than standard sizes enumerated above.

"(a) When not of the sizes enumerated above, the barrels shall be marked with bold, broad-faced letters at least one inch in height in terms of the fractional part of the barrel; for instance, a barrel that contains three-fourths of a standard barrel shall be marked '¾ barrel.'

"(b) Baskets or containers which are not of the standard size enumerated above, shall be marked in bold, broad-faced letters, at least one-half inch in height, given in terms of dry quarts, dry pints and half-pints or in terms of net weight.

NOTE. This does not in any way affect the contractual rights of the buyer and seller, and when the buyer is entitled to receive heap or special measure, under sections 6 and 8 of the General Business Law, the basis of payment must be such heap or special measure.

"(c) Variations or tolerances shall be allowed of the same amount as prescribed in Regulation (2).

"For method of measuring, see Regulation 2 (d)."

If persons selling vegetables will sell by the head, or by weight, and will mark the number, or the net weight (or the gross and tare weight) on the side or top of the container, or on a label or tag attached to the vegetables, they will always be on the safe side. Otherwise they will constantly have to be on their guard as to whether or not the container is or is not of a standard size, and if they sell by dry measure, the provisions of the law as to heaping measure, and fixed weight bushels will have to be borne in mind.

* GUIDE FOR VEGETABLE GROWERS

Name of vegetable	Seed for 100 ft.	Time to plant seeds: Hot-beds	Time to plant seeds: Cold-frames	Time to plant seeds: Open ground	Depth to plant seed (inches)	Time to transplant	Distance apart of rows: Horse culture	Distance apart of rows: Hand culture	Distance apart of plants in rows	Ready for use after planting
Artichokes, globe	1 oz.	March	April	May	½	May	3 to 4 ft.	2 to 3 ft.	2 to 3 ft.	15 months
Asparagus	60 to 80 plants			April or May		April or May	3 to 5 ft.	12 to 24 in.	12 in.	2 to 3 years
Beans, dwarf	1 pt.	March	April	May to July	1	June	30 to 36 in.	18 to 24 in.	3 to 4 in.	45 to 65 days
Beans, pole	½ pt.	March	April	May or June	1	June	3 to 4 ft.	2 to 3 ft.	3 to 4 in.	50 to 80 days
Beets	2 oz.	March	April	May to Aug.	½ to 1	May	24 to 36 in.	12 to 18 in.	4 to 6 to foot	60 to 85 days
Brussels sprouts	¼ oz.	March	April	May, June	½	May, June	30 to 36 in.	18 to 24 in.	12 to 18 in.	95 to 120 days
Cabbage, early	¼ oz.	March		April, May	½	April, May	30 to 36 in.	18 to 24 in.	12 to 18 in.	90 to 100 days
Cabbage, mid-season	¼ oz.		April	May	½	May, June	30 to 36 in.	24 to 30 in.	16 to 24 in.	100 to 120 days
Cabbage, late	¼ oz.		May	June	½	June, July	36 to 42 in.	30 to 36 in.	20 to 30 in.	100 to 130 days
Carrots	1 oz.	March	April	May, June	¼ to ½		24 to 30 in.	12 in.	2 to 3 in.	75 to 110 days
Cauliflower	¼ oz.	April	May	May, June	½	May, June	30 to 36 in.	18 to 24 in.	14 to 18 in.	100 to 130 days
Celery, early	¼ oz.	March		April	¼ or less	April	3 to 6 ft.	18 to 24 in.	3 to 5 in.	120 to 130 days
Celery, late	¼ oz.		April	May	¼ or less	May, June	4 to 6 ft.	24 to 42 in.	4 to 8 in.	130 to 150 days
Corn, early	¼ pt.	April	April	May	1 to 1½	May	30 to 36 in.	18 to 24 in.	Hills 18 to 24 in.	65 to 90 days
Corn, late	¼ pt.			May, June	1 to 1½		36 to 42 in.	30 to 36 in.	Hills 30 to 36 in.	75 to 100 days
Cucumbers	½ oz.	March	April	May, June	½ to 1	May	4 to 6 ft.	4 ft.	Hills 4 ft.	60 to 80 days
Dandelion	¼ oz.		April to Aug.	May	½		24 to 30 in.	12 to 18 in.	12 to 18 in.	6 to 12 months
Endive	1 oz.	March	April	June to Aug.	½	April	24 to 30 in.	12 to 18 in.	12 to 18 in.	90 to 130 days
Kale	¼ oz.		April	June to Aug.	½	May	24 to 30 in.	18 in.	18 in.	90 to 120 days
Kohl-rabi	¼ oz.	April	April	May to July	½	May	30 to 36 in.	12 in.	12 to 18 in.	60 to 80 days
Leek	½ oz.	April	May	May, June	½	May, June	24 to 30 in.	6 to 12 in.	4 to 8 in.	120 to 180 days
Lettuce	½ oz.	March	Apr. on.	April to Aug.	½	May on	24 to 30 in.	10 to 12 in.	Head 10 in.	60 to 90 days
Muskmelons	½ oz.	April	April	May, June	½ to 1	May	6 to 8 ft.	6 ft.	Hills 6 ft.	120 to 150 days
Onions	1 oz.	March	April	April, May	½	April, May	24 to 30 in.	1 ft.	2 in.	130 to 150 days
Parsley	¼ oz.	March	March	April, May	¼ to ½	April, May	24 to 30 in.	12 to 18 in.	3 to 6 in.	90 to 120 days
Parsnips	½ oz.		April	April, May	¼ to ½		30 to 36 in.	12 to 18 in.	3 to 4 in.	125 to 160 days
Peas, early	1 qt.		April	April	1 to 2		3 to 4 ft.	18 to 24 in.	Close	40 to 80 days
Peas, late	1 qt.			May, June	1 to 2		4 to 5 ft.	24 to 36 in.	Close	65 to 90 days
Peppers	⅛ oz.	March	April	June	½	May, June	30 to 36 in.	12 to 18 in.	15 to 18 in.	100 to 140 days
Potatoes, early	5 to 8 lbs.		April	April	3 to 5		30 to 36 in.	24 to 30 in.	12 to 14 in.	80 to 100 days
Potatoes, late	5 to 8 lbs.			May, June	3 to 5		36 to 42 in.	30 to 36 in.	12 to 18 in.	100 to 140 days
Pumpkins	½ oz.		April	May, June	1 to 1½		8 to 12 ft.	8 ft.	Hills 8 ft.	100 to 140 days
Radishes	1 oz.	March	April	April to Sept.	½		24 to 30 in.	8 to 12 in.	1 in.	20 to 40 days
Salsify	1 oz.		April	May	½ to 1		30 to 36 in.	12 to 18 in.	4 to 6 in.	120 to 180 days
Spinach	1 oz.	March	April	April, May, August	½		30 to 36 in.	12 to 18 in.	3 to 4 in.	30 to 60 days
Squash	½ oz.	April	April	May, June	1 to 1½	May, June	3 to 10 ft.	3 to 8 ft.	Hills 3 to 8 ft.	Bush 60 to 80 days, running 120 to 160 days
Tomatoes	⅛ oz.	March	April	June	¼ to ½	June, July	3 to 5 ft.	18 to 36 in.	1½ to 3 ft.	100 to 140 days
Turnips	½ oz.	March	April	April to Aug.	½	April, May	30 to 36 in.	12 to 18 in.	6 to 10 in.	60 to 80 days
Watermelons	1 oz.		April	May, June	1 to 1½	May	8 to 12 ft.	8 ft.	Hills 8 ft.	100 to 120 days

* Reprint from Cornell Reading Course Lesson, Vol. II, No. 33, Garden Series No. 1.

TABLE SHOWING ACREAGE AND VALUE OF VEGETABLES PRODUCED IN NEW YORK STATE BY COUNTIES — (U. S. CENSUS, 1910)

County	Acreage of all vegetables not including potatoes	Acreage of potatoes	Value of all vegetables including potatoes
Albany	4,614	3,708	$560,054
Allegany	1,325	13,412	649,420
Broome	1,446	7,106	471,759
Cattaraugus	1,829	7,392	501,663
Cayuga	3,238	8,089	635,210
Chautauqua	4,291	6,329	615,102
Chemung	969	3,724	255,707
Chenango	1,284	4,843	439,100
Clinton	1,059	8,673	594,114
Columbia	1,291	3,144	254,676
Cortland	2,229	4,961	523,515
Delaware	1,094	4,331	371,903
Dutchess	1,679	3,041	386,528
Erie	10,270	2,769	196,928
Essex	662	23,587	1,990,494
Franklin	824	7,273	591,627
Fulton	579	2,485	196,341
Genesee	3,093	9,585	586,620
Greene	1,452	1,948	219,711
Hamilton	101	418	44,514
Herkimer	1,173	4,167	364,461
Jefferson	1,952	5,319	454,184
Kings	848	591	133,448
Lewis	748	4,102	290,954
Livingston	5,435	11,163	803,079
Madison	6,718	4,566	752,130
Monroe	9,491	20,211	1,984,715
Montgomery	1,021	2,007	204,201
Nassau	10,472	8,685	1,763,139
New York	376	38	83,672
Niagara	6,953	6,918	711,847
Oneida	8,715	8,721	1,089,590
Onondaga	8,525	13,794	1,459,496
Ontario	9,426	14,857	1,008,012

County	Acreage of all vegetables not including potatoes	Acreage of potatoes	Value of all vegetables including potatoes
Orange	6,164	3,063	$998,515
Orleans	4,418	4,111	509,996
Oswego	3,126	7,507	612,473
Otsego	7,446	7,946	586,792
Putnam	327	863	99,684
Queens	7,100	2,581	1,408,984
Rensselaer	2,102	10,008	718,573
Richmond	1,634	139	311,944
Rockland	623	958	130,811
St. Lawrence	1,960	7,321	589,215
Saratoga	2,018	7,278	485,423
Schenectady	732	1,135	132,956
Schoharie	823	3,273	219,464
Schuyler	376	3,045	149,554
Seneca	1,440	2,833	206,093
Steuben	2,737	30,524	1,434,758
Suffolk	7,050	15,407	2,339,279
Sullivan	803	3,312	243,741
Tioga	599	5,960	334,936
Tompkins	913	4,908	345,297
Ulster	2,346	4,282	446,927
Warren	844	1,882	165,381
Washington	1,052	10,443	656,588
Wayne	5,622	9,280	844,690
Westchester	1,715	1,757	400,014
Wyoming	952	9,879	601,737
Yates	1,411	2,667	147,805
The State	175,515	394,319	$36,309,544

REFERENCE BOOKS FOR VEGETABLE GROWERS

American Varieties of Beans, C. D. Jarvis	
Asparagus, *F. M. Hexamer*, Orange Judd Co.	$.50
Asparagus Culture, *Barnes & Robinson*, David McKay	.50
Bean Culture, *G. C. Sevey*, Orange Judd Co.	.50
Book of Asparagus, The, *Charles Ilott*, John Lane Co.	1.00
Book of Corn, The, *Herbert Myrick*, Orange Judd Co.	1.50
Book of Rarer Vegetables, The, *Wythe and Roberts*, John Lane Co.	1.00
Book of Vegetables and Garden Herbs, *Allen French*, The Macmillan Co.	1.75
Cabbage and Cauliflower for Profit, *J. M. Lupton*, Webb Pub. Co.	.30
Cabbage, Cauliflower and Allied Vegetables, *C. L. Allen*, Orange Judd Co.	.50
Cabbages and Cauliflowers, Etc., *Jas. J. H. Gregory*, Orange Judd Co.	.30
Cabbages: How to Grow Them, *Jas. J. H. Gregory*, Orange Judd Co.	.30
California Vegetables in Garden and Field, *E. J. Wickson*, Pacific Rural Press	2.00
Carrots, Mangold-Wurzels, Etc., *Jas. J. H. Gregory*, Orange Judd Co.	.30
Celery Culture, *W. R. Beattie*, Orange Judd Co.	.50
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Culture of Vegetables and Flowers, The, *Sutton & Sons*, Simpkin, Marshall, Hamilton, Kent & Co.	1.25
Farm and Garden Rule Book, The, *L. H. Bailey*, The Macmillan Co.	2.00
Fertilizers and Crops, *L. L. Van Slyke*, Orange Judd Co.	3.00
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Greenhouse Construction, *L. R. Taft*, Orange Judd Co.	1.50
Greenhouse Management, *L. R. Taft*, Orange Judd Co.	1.50
History of Cultivated Vegetables, *Henry Phillips*, Henry Colburn, (London, 1827)	
Home Garden, The, *E. E. Rexford*, J. B. Lippincott Co.	1.00
Home Vegetable Garden, *F. F. Rockwell*, John C. Winston Co.	1.10
How to Make a Vegetable Garden, *Edith Loring Fullerton*, Doubleday, Page & Co.	2.00
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Principles of Soil Management, *Lyon & Fippin*, The Macmillan Co.	1.75
Principles of Vegetable Gardening, *L. H. Bailey*, The Macmillan Co.	1.50
Profitable Culture of Vegetables, The, *Thomas Smith*, Longmans, Green & Co.	2.00

Soil, The, *F. H. King*, The Macmillan Co. . . . $1.50
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Spraying of Plants, *E. G. Lodeman*, The Macmillan Co. . . . 1.25
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Success in Market Gardening, *Herbert Rawson*, Doubleday, Page & Co. . . . 1.10
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Vegetable Garden, The, *Vilmorin & Robinson* (Eng. trans.), Orange Judd Co. . . . 5.00
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"Gardeners' Chronicle," London, Eng.

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